Appendix A. BMP Verification Principles

The Bay Program Partners developed and adopted a set of BMP verification principles to both guide the development of the verification guidance by the workgroups and other components of the basinwide verification framework and establish the basis on which to evaluate the development and implementation of enhanced jurisdictional BMP verification programs. The BMP Verification Committee developed the five verification principles, with review and input provided by the BMP Verification Review Panel, Water Quality Goal Implementation Team, and Management Board, and approval by the Principals' Staff Committee. The Bay Program Partners had these five original verification principles approved at the Principals' Staff Committee's December 5, 2012 meeting[1] and in place more than a year prior to final review and approval of the workgroup's BMP verification guidance along with the rest of the verification framework. The principles have provided the common bar with which the partners could judge the distinct components of the framework to ensure in the end, everything would be aligned to hit the same mark.

Chesapeake Bay Program Partnership's BMP Verification Principles[2]

The priority of the Chesapeake Bay Program (CBP) Partnership is the implementation of the Chesapeake Bay TMDL, the jurisdictions' Watershed Implementation Plans, and 2-year milestones. The Partnership has committed to the development of a basinwide best management practice (BMP) verification framework for use by the seven watershed jurisdictions to assure data quality for BMP reporting for annual Model Progress runs. The CBP Partnership will establish a BMP Verification Review Panel which will examine the degree to which a jurisdiction's program meets the parameters established by the Partnership's BMP verification framework. This review will include an examination of existing BMP measurements, accounting, and inspection systems and any proposed improvements to those systems submitted for CBP Partnership review. The Partnership recognizes that some jurisdictional programs may already achieve some of these principles and may not require significant modification or enhancements.

The CBP Partnership has defined verification as the process through which agency partners ensure practices, treatments, and technologies resulting in reductions of nitrogen, phosphorus, and/or sediment pollutant loads are implemented and operating correctly. The process for verifying tradable nutrient credits or offsets is a separate, distinct process not addressed either by these principles or through the partnership's BMP verification framework.

Working to verify that practices are properly designed, installed, and maintained over time is a critical and integral component of transparent, cost efficient, and pollutant reduction effective program implementation. Verification helps ensure the public of achievement of the expected nitrogen, phosphorus, and sediment pollutant load reductions over time. The CBP Partnership will build from existing practice tracking and reporting systems and work towards achieving or maintaining the following principles.

[1] http://www.chesapeakebay.net/calendar/event/19044/

[2] Adopted by the Chesapeake Bay Program Partnership's Principals' Staff Committee at its December 5, 2012 meeting.

PRINCIPLE 1: PRACTICE REPORTING
Verification is required for practices, treatments, and technologies reported for nitrogen, phosphorus, and/or sediment pollutant load reduction credit through the Chesapeake Bay Program (CBP) partnership.

Verification protocols may reflect differing tools and timelines for measurement, as appropriate, for a specific BMP. For example:

- A permit (e.g., MS4) may establish periodic inspections for a regulatory BMP;
- A contract may govern examinations of a cost-shared structural (e.g., manure storage structure) or annual (e.g., cover crops) BMPs; or
- A statistical sampling may best define measurement for non-cost shared structural, annual and/or management BMPs.

Verification protocols will ensure that under normal operating conditions:

- Structural practices are properly designed, installed, and functionally maintained to ensure that they are achieving the expected nitrogen, phosphorus, and sediment pollutant load reductions reviewed and approved to by the CBP Partnership;
- Practices, including annual practices, meet the CBP Partnership's implementation and management definitions;
- Practices are consistent with or functionally equivalent to established practice definitions and/or standards;
- Practices are not double counted; and
- Practices are currently functional at the time of seeking credit and not removed from the landscape.

For verified practices not consistent with, nor fully or partially functionally equivalent to, established practice definitions and/or standards, partners and stakeholders can seek CBP Partnership approval for crediting through the established CBP Partnership's BMP review protocol.

Any practice, treatment, and technology (or partial or full equivalency) approved by the CBP Partnership that is properly tracked, verified, and reported will be incorporated into the CBP Partnership's models and credited in the accounting of progress toward the jurisdictions' milestones and in the interpretation of observed trends in monitoring data.

PRINCIPLE 2: SCIENTIFIC RIGOR
Verification of practices assure effective implementation through scientifically rigorous and defensible, professionally established and accepted sampling, inspection, and certification protocols regardless of funding source (cost share versus non-cost share), source sector (agriculture, urban, etc.), and jurisdiction (state, local). A method and schedule for confirmations to account for implementation progress over time will help ensure scientific rigor. Verification shall allow for varying methods of data collection that balance scientific rigor with cost-effectiveness and the significance of or priority placed upon the practice in achieving pollution reduction.

PRINCIPLE 3: PUBLIC CONFIDENCE
Verification protocols incorporate transparency in both the processes of verification and tracking and reporting of the underlying data. Levels of transparency will vary depending upon source sector, acknowledging existing legal limitations and the need to respect individual confidentiality to ensure access to non-cost shared practice data.

PRINCIPLE 4: ADAPTIVE MANAGEMENT
Advancements in Practice Reporting and Scientific Rigor, as described above, are integral to assuring desired long-term outcomes while reducing the uncertainty found in natural systems and human behaviors. Verification protocols will recognize existing funding and allow for reasonable levels of flexibility in the allocation or targeting of those funds. Funding shortfalls and process improvements will be identified and acted upon when feasible.

PRINCIPLE 5: SECTOR EQUITY
Each jurisdiction's program should strive to achieve equity in the measurement of functionality and effectiveness of the implemented BMPs among and across the source sectors.

Transparency

The public confidence principle was amended from its original form adopted in the fall of 2013 in response to separate requests originating from the Bay Program's Agriculture Workgroup and the Citizens Advisory Committee for a specific definition of transparency and descriptions of how it would be operationally applied (Table 3). The Transparency Subgroup of BMP Verification Committee members,[3] along with Rebecca Hanmer, Citizen Advisory Committee member, drafted up the addendum to the public confidence principle working closely with the Bay Program's Agriculture Workgroup, the BMP Verification Review Panel, and the BMP Verification Committee (Appendix N).

As described in the May 22, 2013 Recommendations of the CAC workgroup on verification and transparency memorandum[4]:

> "Transparency means operating in a way that is easy for others to see what actions are performed. Thus, when applied to government programs, transparency is a method where decision-making is carried out in a manner readily accessible to the public. Absent a legal constraint, all draft documents, work products, and final decisions or document, and the decision making process itself, are made public and remain publicly available. Transparency means an outside reviewer can determine what data were used as a basis for a deliberative decision or conclusion to generate a report. Included would be how the data were obtained, what measure are employed to ensure the data is accurate, who is responsible for data generation and collection as well as who is responsible for ensuring data accuracy, and the methods of analysis utilized."

[3] http://www.chesapeakebay.net/groups/group/bmp_verification_transparency_subgroup
[4] Harrison, V., Hanmer, R., Der, A., and J. Blackburn. May 22, 2013. Recommendations of the CAC workgroup on verification and transparency. Available on-line at: http://www.chesapeakebay.net/channel_files/20829/memo_to_cac_from_verification_and_transparency_workgroup_may_22_2013.pdf

Transparency is incorporated in the Clean Water Act and its regulatory and policy frameworks, which establishes public access and site-specific data transparency requirements for all sources of nutrients and sediments regulated as point sources. The following transparency definition and numbered descriptions of how this definition will be applied (Table 3) were recommended to the Bay Program Partners by the Committee to clarify how the concept of transparency operationally applied across all nonpoint sources of nutrient and sediment pollutants.

Table A-1. Transparency Addendum to the BMP Verification Public Confidence Principle

Transparency means operating in a way so any outside reviewer can determine what actions were taken, which data were synthesized to generate a report or conclusion, how data was collected and obtained, what measures were employed to ensure data accuracy, who is responsible for data collection and synthesis, who is responsible for ensuring data accuracy, and the methods of data analysis utilized.

1. The measure of transparency will be applied to three primary areas of verification: data collection, data validation, and data reporting.
2. Transparency of the process of data collection must incorporate clearly defined quality assurance/quality control (QA/QC) procedures, which may be implemented by the data-collecting agency or by an independent external party.
3. Transparency of the data reported should be transparent at the finest possible scale that conforms with legal and programmatic constraints, and at a scale compatible with data input for the Chesapeake Bay Program Partnership's modeling tools.
4. It is recognized that transparency of data reported will vary across verification methods and data collection and reporting programs. This variance, however, should not negate the commitment and obligation to ensure transparency at the highest level possible in collection, synthesis and reporting.

[**Editor's note**: The transparency addendum text in Table A-1 is still draft and subject to change pending final review and approval by the Bay Program's Principals' Staff Committee]

The definition for transparency and its operational application were largely drawn from the work of the Bay Program's Citizens Advisory Committee and its Workgroup on Verification and Transparency as documented within their May 22, 2013 memorandum[5] (See Appendix T). The BMP Verification Review Panel carefully reviewed the proposed transparency addendum and provided their recommended text changes in their transmitted November 19, 2013 recommendations document (Appendix D). The BMP Verification Committee made its

[5] Harrison, V., Hanmer, R., Der, A., and J. Blackburn. May 22, 2013. Recommendations of the CAC workgroup on verification and transparency. Available on-line at: http://www.chesapeakebay.net/channel_files/20829/memo_to_cac_from_verification_and_transparency_workgroup_may_22_2013.pdf

decisions on the transparency addendum text that was then forwarded to the Bay Program for final review and decisions by the PSC as part of the larger basinwide BMP verification framework.

In its November 19, 2013 recommendation document[6], the BMP Verification Review Panel recommended the Bay Program adopt and use the following terms and definitions in all its individual partners' and collective programmatic descriptions and documentation of verification, particularly in place of the terms like "third party". The Panel recommended the following definitions to both compliment and further clarify the application of the transparency addendum to the BMP public confidence principle as well as clarify the use of these terms in the workgroup's BMP verification guidance and the resultant jurisdictions' BMP verification programs.

Each of these terms has significant implications when they are used in verification guidance and protocols, each carrying with it time and resource investment implications. The use of the terms "independent" and "external independent" and parts of the wording for the definitions below were drawn directly from publications on the topic of peer review authored by the National Research Council, the U.S. Army Corps of Engineers, and the U.S. Environmental Protection Agency, and are consistent with USDA Natural Resources Conservation Service verification procedures.

> Independent Review: a review carried out by someone within the same organization having technical expertise in the subject matter to a degree at least equivalent to that needed for the original work, but who was not involved as a participant, supervisor, technical reviewer, or advisor in the development or operations of the program/practice under review.
>
> External Independent Review: a review carried out by a separate outside organization with technical expertise in the subject matter to a degree at least equivalent to that needed for the original work. Generally, this level of review is sought when considering key decisions that are being made that could affect the overall verification program.

[6] Chesapeake Bay Program Partnership BMP Verification Review Panel's Guidance and Recommendations to the Six Source Sector Workgroups, the CBP BMP Verification Committee, and the Seven Watershed Jurisdictions. Distributed November 19, 2013. http://www.chesapeakebay.net/channel_files/21511/cbp_bmp_verif_review_panel_recommendations_11_19_2013.pdf

Chesapeake Bay Program partners' Agriculture Workgroup's Agricultural BMP Verification Guidance

Approved August 8, 2014

PROLOGUE: CRITICAL OVERARCHING ISSUES

In developing this verification guidance for agricultural practices, the Agricultural Work Group wrestled with a host of complicated and sometimes competing interests and perspectives. In completing the guidance, the Work Group concluded that three critical overarching issues warranted future consideration by entities other than the Work Group.

Critical Overarching Issue One: Revisiting of the Guidance's "Less than 5%" Criteria

The guidance attempts to follow the targeting recommendation of the BMP Verification Review Panel; i.e., that verification efforts should be targeted, e.g., to either those practices that accomplish the greatest pollution load reductions or those practices that are the most vulnerable. In considering this recommendation, the verification guidance proposes that jurisdictions apply less comprehensive verification efforts to those practices accounting for 5% or less of a pollutant load (see Guidance, Section XXX). In reaching this conclusion, the Work Group determined that the sum total of practices accounting for 5% or less within a jurisdiction was not likely to reach a significant level. That is, the sum total of practices receiving less verification because of the "less than 5%" criteria would not exceed, hypothetically, 25% or 50%. The actual number of practices receiving reduced levels of verification because of these criteria is not, however, actually known. The Work Group determined that **the actual impact of this guidance decision needs to be re-examined and re-evaluated** by **the Chesapeake Bay Program partners** in two years. At that time, if the actual numbers indicate that the "less than 5%" criteria led to an unreasonable level of practices receiving less comprehensive verification, the Bay Program partners may need to adopt revised criteria.

Critical Overarching Issue Two: USDA's 5% Verification Cap

USDA currently places a cap on its level of verification of contracted cost-share practices at 5%. USDA documents reflect that USDA bases this verification level primarily on dollars spent, not pollution control achieved. In addition, USDA limits access to location information of the practices for purposes of conducting verification. The Agricultural Work Group recognized that the Bay Program's state jurisdictions cannot alter the federal USDA verification standards, and that only a sister federal agency such as EPA has the ability to challenge and, as appropriate, rework this federal standard for Chesapeake Bay water quality improvement. The Work Group determined that **EPA and USDA** must take the necessary steps **to together determine the appropriate federal standard for verification of USDA contracted cost-share practices** from a water quality, natural resource stewardship perspective.

Critical Overarching Issue Three: Application of the "Independent Review" Definition to Agricultural Practices.

The BMP review panel defines "independent review" as follows:

> Independent Review: a review carried out by someone within the same organization having technical expertise in the subject matter to a degree at least equivalent to that needed for the original work, but who was not involved as a participant, supervisor, technical reviewer, or advisor in the development or operations of the program/practice under review.
>
> External Independent Review: a review carried out by a separate outside organization with technical expertise in the subject matter to a degree at least equivalent to that needed for the original work. Generally, this level of review is sought when considering key decisions that are being made that could affect the overall verification program.

In considering the practicalities of development and implementation of agricultural practices within some jurisdictions, the definitional phrase "who was not involved as a participant, supervisor, technical reviewer, or advisor in the development or operations of the program/practice under review" could place significant restrictions on the ability to conduct verification of agricultural BMPs. There are areas in Bay jurisdictions where only one office of several staff is geographically able to conduct the verification. The current definition, because of the language referring to "supervisor," "reviewer," and "advisor," may eliminate any and all staff as one able to conduct an "independent review." The Work Group determined that **the BMP Review Panel** needs to **re-examine the definition** and determine if revision is necessary for the agricultural sector.

Part 1: The Need for Agricultural BMP Verification and the Bay Program Process
With the establishment of a Chesapeake Bay Total Maximum Daily Load (TMDL) and the jurisdictions' commitment to demonstrate reasonable assurance that the TMDL goals will be met, tracking, reporting, and verification of best management practice (BMP) implementation is essential. An improved approach to verification is needed to expand the tracking and reporting of implemented BMPs from agency incentive programs to private, non-cost shared and resource improvement practices in a manner that ensures public confidence that the water quality benefits from the practices are achieved. The Chesapeake Bay TMDL has brought new urgency to the matter, reinforced by calls for enhanced verification by:

- The Chesapeake Bay Independent Evaluation Report developed by the National Research Council's (NRC) panel identified five specific science-based conclusions. These conclusions focused on the finding that "accurate tracking of BMPs is of paramount importance because the CBP relies upon the resulting data to estimate current and future nutrient and sediment loads to the Bay."

- President Obama's Chesapeake Bay Executive Order Strategy committed relevant federal agencies, including the U.S. Department of Agriculture (USDA) and the U.S. Environmental Protection Agency (EPA), to develop and implement "mechanisms of for tracking and reporting of voluntary conservation practices and other best management practices installed on agricultural lands" by July 2012.

- EPA's Chesapeake Bay TMDL's Appendix S outlined the common elements for the jurisdictions to develop and implement trading and offset programs in conjunction with the requirements of the TMDL.

- Several of the Chesapeake Bay Program's independent advisory committees, including the Scientific and Technical Advisory Committee (STAC) and the Citizen's Advisory Committee (CAC), have consistently requested Bay Program partners to develop and implement an open and transparent process to verify cost-share and non-cost shared BMPs being annually tracked and reported by the jurisdictions to the Chesapeake Bay Program Office (CBPO).

In 2012 the Chesapeake Bay Program (CBP) partners' Water Quality Goal Implementation Team requested each of the source and habitat sector workgroups, including the Agriculture Workgroup, to develop guidance for jurisdictions as they seek to enhance verification of BMP implementation. As a part of this effort, the Agriculture Workgroup identified several key factors critical to building a verification protocol for agricultural BMPs.

- Were public funds used to implement the practice, or was the practice funded entirely with private dollars?

- Was the practice implemented to satisfy a federal or state regulatory requirement, or is it external to regulatory oversight?

- Is the practice structural, with a multi-year life-span, or must it be implemented annually?

- Is the practice implemented "on-the-ground" or is it a plan or other enhancement of farm management?

These factors influence the reliability of reported information and the reasonable assurance of whether the practice is implemented properly and remains functional. The following narrative considers these factors and the consequent guidance to jurisdictions for a science and best professional judgment informed verification protocol.

Part 2: Defining and Categorizing Agricultural BMPs

The Bay Program partners approved agricultural BMPs represent the largest and most diverse group of conservation practices and land use conversions across all sectors. The diversity of BMPs reflects the diversity of agricultural production and land uses across the Chesapeake Bay watershed. To address the challenge of providing verification guidance for this diverse collection of BMPs in a simple format, agricultural BMPs are organized into three categories (Table 2). The three BMP categories are based on the assessment method for their physical presence, primarily, as well as on the respective life spans or permanence on the landscape.

2a. Visual Assessment BMPs - Single Year

A practice that can be visually assessed and with a limited physical presence in the landscape over time, i.e., lasting as short as several months to a single growing season. In order to accurately account for nutrient and sediment load reduction benefits, this type of BMP must be verified and reported on an annual basis.

2b. Visual Assessment BMPs - Multi-Year

A practice that can be visually assessed and has a protracted physical presence on the landscape, i.e., of more than one year when properly maintained and operated. This type of BMP often requires increased technical and financial resources to implement compared with a single year practice.

2c. Non-Visual Assessment BMPs

A practice that cannot typically be visually assessed because it is a type of management system or enhanced approach, rather than a physical BMP. This class of BMPs is more challenging to verify since it does not have a physical presence on the landscape. However, considerable nutrient and sediment reductions are possible in well-implemented plans that can last either a single season or multiple years.

Table B-1. Examples of agricultural BMPs by category.

B-1a. Visual Assessment-Single Year	B-1b. Visual Assessment - Multi-Year	B-1c. Non-Visual Assessment
Conservation Tillage	Animal Waste Management Systems	Decision/Precision Agriculture
High-Residue Minimum Disturbance Management	Barnyard Runoff Control	Swine Phytase
Traditional Cover Crops	Stream Side Grass Buffers	Enhanced Nutrient Management Plans
Commodity Cover Crops	Prescribed Grazing	Soil Conservation and Water Quality Plans
	Pasture Alternative Watering Systems	Poultry Litter Transport

Part 3: Defining Implementation Mechanisms for Agricultural BMPs

The diversity of agricultural BMPs is mirrored in the range of approaches and funding sources supporting implementation and the resultant level of oversight across the Chesapeake Bay watershed. The sources of BMP implementation data and their maintenance oversight are grouped into four broad categories with potential for mixing between categories dependent upon the specific BMP. How a BMP is funded and implemented has direct implications for how verification of presence and function is conducted:

3.a. Non-Cost-Shared (Privately Funded) BMPs

BMPs that are implemented without public funding assistance are a source of agricultural BMPs installed without the verification benefits inherent to the other categories - public cost-share, regulatory programs, and permit-issuing programs. As a result, the establishment of verification programs providing similar certainty to those for publically funded or regulated practices will be needed.

Non-cost share BMPs are typically financed by the operator or other non-public entity or source, and may or may not meet the practice standards associated with federal and state cost-share programs. Non-cost-shared practices may lack the contractual provisions of cost-shared BMPs as well as the corresponding implementation and maintenance oversight. Non-cost share BMPs also include BMPs which are described as "resource improvement (RI) practices." Resource Improvement BMP's are practices which provide

similar annual environmental benefits for water quality but may not fully meet all the design criteria of existing governmental design standards. See Resource Improvement Practice Definitions and Verification Visual Indicators Guidance Document for applicable verification guidelines.[1]

In order to satisfy the expectation for verification of non-cost shared BMPs, it is recommended that a jurisdiction verify 100% of the initial identification of annual or multi-year structural BMPs and plan implementation by trained and certified technical field staff or engineers with supporting documentation that it meets the governmental and/or CBP practice standards.[2] Visual assessment for single year BMPs, such as tillage practices, can be statistically sub-sampled utilizing scientifically accepted procedures.[3]

Additionally, it is recommended that a jurisdiction adopt one of the two approaches detailed below regarding follow up sub-sampling verification of non-cost shared BMPs. It is recommended that jurisdictions adopt the first approach as a default. The second approach for follow up sub-sampling may be proposed by a jurisdiction with documentation as an alternative strategy for review and approval.

1. During the course of the physical lifespan period of multi-year BMPs, reoccurring annual assessments are recommended to be implemented so that BMPs are verified as being maintained and operated in accordance with the appropriate federal, state or CBP practice standard. As a default, random, follow-up assessments are recommended to be conducted on 10% of those multi-year BMPs which are known to collectively account for greater than 5% of a jurisdiction's agricultural sector nutrient and/or sediment load reductions as estimated in the most recent progress scenario. (See Appendix A Example). For example, if the Chesapeake Bay Program partners' Watershed Model estimates that 7% of all the nitrogen reductions from a jurisdiction's agricultural nitrogen load resulted from the collective implementation of prescribed grazing, then the jurisdiction should conduct random, follow-up inspections on 10% of all farms with reported prescribed grazing systems.[4]

2. A jurisdiction may propose an alternative strategy for follow up sub-sampling of non-cost shared BMPs. Any such alternative shall be accompanied by documentation of the rationale for the alternative. The BMP Verification Review Panel shall review the alternative strategy and make a recommendation to EPA on the adequacy of the

[1] http://www.chesapeakebay.net/publications/title/21973

[2] For BMPs that constitute ≤5% of the jurisdiction's agricultural sector nutrient and/or sediment load reductions as estimated in the most recent progress scenario, 5% statistical sub-sampling of tracked and reported practices is allowable for the non-cost share and regulatory program BMP categories in this section. For cost-shared category BMPs, 5% of the active contracts is permissible, and for permit-issued BMPs, 20% sampling is recommended.

[3] For BMPs that constitute ≤5% of the jurisdiction's agricultural sector nutrient and/or sediment load reductions as estimated in the most recent progress scenario, 5% statistical sub-sampling of tracked and reported practices is allowable for the non-cost share and regulatory program BMP categories in this section. For cost-shared category BMPs, 5% of the active contracts is permissible, and for permit-issued BMPs, 20% sampling is recommended.

[4] For BMPs that constitute ≤5% of the jurisdiction's agricultural sector nutrient and/or sediment load reductions as estimated in the most recent progress scenario, 5% statistical sub-sampling of tracked and reported practices is allowable for the non-cost share and regulatory program BMP categories in this section. For cost-shared category BMPs, 5% of the active contracts is permissible, and for permit-issued BMPs, 20% sampling is recommended.

alternative. An example of one such alternative is currently being developed by the Agriculture Workgroup for review and approval, at which time it will be provided to Bay Program partners as a supplemental document to the agricultural BMP verification guidance.

It is important to note that BMPs which were initially implemented and/or operated under a cost-share, regulatory, or permit program but are transitioned out of these programs and no longer are under the oversight of a cost-share agreement, regulation, or permit, will be verified by the same level of verification described for non-cost shared BMPs if they are continued to be considered for ongoing pollution reduction crediting.

3. b. Cost-Shared BMPs

BMPs that are implemented with public funds; these funds are managed by federal, state, and county agencies, and in some cases non-governmental organizations (NGOs). Cost-shared BMPs typically have contractual oversight elements such as the required involvement of certified engineers, planners and technicians who evaluate the BMPs according to governmental established design standards. These standards are intended to ensure proper installation and maintenance of the BMP over the life span of the contract and consequently so as to allow tracking and reporting on the BMPs during the life of the contract. BMPs implemented through these programs typically have existing defined verification protocols in place for the BMP during the life of the contract with the landowner dictating implementation, operation and maintenance requirements, and may provide a sufficient level of verification.

In order to satisfy the expectation for verification of cost-shared BMPs, it is recommended that a jurisdiction verify 100% of the initial identification of annual or multi-year structural BMPs and plan implementation by trained and certified technical field staff or engineers with supporting documentation that it meets the governmental and/or CBP practice standards. Visual assessment for single year BMPs, such as tillage practices, can be statistically sub-sampled utilizing scientifically accepted procedures.

Additionally, it is recommended that a jurisdiction adopt one of the two approaches detailed below regarding follow up sub-sampling verification of cost-shared BMPs. It is recommended that jurisdictions adopt the first approach as a default. The second approach for follow up sub-sampling may be proposed by a jurisdiction with documentation as an alternative strategy for review and approval.

1. During the period of contractual oversight for multi-year BMPs, reoccurring annual contractual compliance inspections are recommended to be implemented so that BMPs are verified as being maintained and operated in accordance with the funding agency's standards. As a default, random, follow-up assessments are recommended to be conducted on 10% of those multi-year BMPs which are known to collectively account for greater than 5% of a jurisdiction's agricultural sector nutrient and/or sediment load reductions as estimated in the most recent progress scenario. (See Appendix A Example). For example, if the Chesapeake Bay Program partners' Watershed Model estimates that 6% of all the nitrogen reductions from a jurisdiction's agricultural nitrogen load resulted from the collective implementation of grass buffers, then the jurisdiction

should conduct random, follow-up inspections on 10% of all farms with reported grass buffers.

2. A jurisdiction may propose an alternative strategy for follow up sub-sampling of cost-shared BMPs. Any such alternative shall be accompanied by documentation of the rationale for the alternative. The BMP Verification Review Panel shall review the alternative strategy and make a recommendation to EPA on the adequacy of the alternative. An example of one such alternative is currently being developed by the Agriculture Workgroup for review and approval, at which time it will be provided to the Bay Program partners as a supplemental document to the agricultural BMP verification guidance.

3.c. Regulatory Programs

Programs that provide oversight of a BMP through a legally imposed regulatory system. Some BMPs may be specifically identified as a legal requirement, while others may be the result of implementation of a legally-required management plan or system. Because regulations differ by state, there are differences in oversight by state and local agencies across the Bay watershed.

BMPs implemented under the requirements of governmental regulatory programs typically have existing but varied verification protocols in place for BMP implementation, operation, and maintenance over the design lifespan of the practice and may provide a sufficient level of verification.

Included within the regulatory program, understanding that offset and credit programs are continuing to evolve, are BMPs tied to offsets, mitigation, and trading. Agricultural verification protocols need to include procedures for identifying and separately managing practices which are tied to offset, mitigation, and trading programs to ensure that BMPs are not double-counted. BMPs tied to offsets, mitigation, and trading programs typically have their own specified verification protocols to achieve their intended programmatic environmental objectives.

In order to satisfy the expectation for verification of regulatory program BMPs, it is recommended that a jurisdiction verify 100% of the initial identification of annual or multi-year structural BMPs and plan implementation by trained and certified technical field staff or engineers with supporting documentation that it meets the governmental and/or CBP practice standards. Visual assessment for single year BMPs, such as tillage practices, can be statistically sub-sampled utilizing scientifically accepted procedures.

Additionally, it is recommended that a jurisdiction adopt one of the two approaches detailed below regarding follow up sub-sampling verification of regulatory program BMPs. It is recommended that jurisdictions adopt the first approach as a default. The second approach for follow up sub-sampling may be proposed by a jurisdiction with documentation as an alternative strategy for review and approval.

1. During the time period of the identified physical lifespan period of multi-year BMPs, reoccurring annual regulatory compliance inspections are recommended to be implemented so that BMPs are verified as being maintained and operated in accordance

with the appropriate federal or state regulatory practice standards. As a default, random, follow-up assessments are recommended to be conducted on 10% of those multi-year BMPs which are known to collectively account for greater than 5% of a jurisdiction's agricultural sector nutrient and/or sediment load reductions as estimated in the most recent progress scenario. (See Appendix A Example). For example, if the Chesapeake Bay Program partners' Watershed Model estimates that 9% of all the nitrogen reductions from a jurisdiction's agricultural nitrogen load resulted from the collective implementation of animal waste management systems, then the jurisdiction should conduct random, follow-up inspections on 10% of all farms with reported animal waste management systems.

2. A jurisdiction may propose an alternative strategy for follow up sub-sampling of regulatory program BMPs. Any such alternative shall be accompanied by documentation of the rationale for the alternative. The BMP Verification Review Panel shall review the alternative strategy and make a recommendation to EPA on the adequacy of the alternative. An example of one such alternative is currently being developed by the Agriculture Workgroup for review and approval, at which time it will be provided to the Bay Program partners as a supplemental document to the agricultural BMP verification guidance.

3.d. Permit-Issuing Programs

Regulatory programs that require an agricultural production operation to operate or conduct certain activities under a permit. Inspections conducted by the regulating authority are typically a condition of the permit. A permit may require periodic renewals for multi-year extensions. Implementation, operation and maintenance of BMPs are permit elements.

BMPs implemented under the oversight of permitting programs typically include defined verification protocols for all stages of BMP implementation, operation, and maintenance for the life of the permit, and may provide a sufficient level of verification.

In order to satisfy the expectation for verification of permit-issuing program BMPs, it is recommended that a jurisdiction verify 100% of the initial identification of annual or multi-year structural BMPs and plan implementation by trained and certified technical field staff or engineers with supporting documentation that it meets the governmental and/or CBP practice standards. Visual assessment for single year BMPs, such as tillage practices, can be statistically sub-sampled utilizing scientifically accepted procedures.

Additionally, it is recommended that a jurisdiction adopt one of the two approaches detailed below regarding follow up sub-sampling verification of permit program BMPs. It is recommended that jurisdictions adopt the first approach as a default. The second approach for follow up sub-sampling may be proposed by a jurisdiction with documentation as an alternative strategy for review and approval.

1. During the permit cycle, and the identified physical lifespan period of multi-year BMPs, reoccurring annual permit compliance inspections are recommended to be implemented so that BMPs are verified as being maintained and operated in accordance with the appropriate federal or state permit practice standards. As a default, random,

follow-up inspections are recommended to be conducted on 20% of those permitted multi-year BMPs, which is consistent with the EPA Concentrated Animal Feeding Operation (CAFO) program agreements with the jurisdictions for non-major permits. All CAFO permits are defined by EPA as being non-major permits. [5]

2. A jurisdiction may propose an alternative strategy for follow up sub-sampling of non-federal state permit-issuing program BMPs. Any such alternative shall be accompanied by documentation of the rationale for the alternative. The BMP Verification Review Panel shall review the alternative strategy and make a recommendation to EPA on the adequacy of the alternative. An example of one such alternative is currently being developed by the Agriculture Workgroup for review and approval, at which time it will be provided to the Bay Program partners as a supplemental document to the agricultural BMP verification guidance.

Part 4: Agricultural BMP Verification Methods

Depending on the jurisdiction, a significant number of agricultural operations may legally operate without oversight from federal and state permitting and regulatory programs or participation in voluntary cost-share programs. Verification of BMPs for all farms, regardless of presence or absence of cost-shared or regulatory programs can be accomplished through the following or combination of the following:

4a. Farm Inventory

A survey or listing of physical BMPs completed by certified, trained technical staff, or by the producer. The survey or listing is based on physical inspection. The reliability of the information and the level of verification depends upon the intensity and frequency of the survey, the training of the person completing the survey, and whether the person completing the survey must certify to its accuracy with penalties for false information. Producer completed inventories without third-party verification are not considered an adequate method for verification.

4b. Office/farm Records

An evaluation of paperwork on record at the conservation district office or the farm operation itself rather than an on-site inspection of physical BMPs. Records alone are not considered an adequate method for verification, but can be a critical compliment to other methods, especially when associated with non-visual assessment BMPs.

4c. Transect Survey

An inspection of a statistical-based sampling of BMPs. A transect survey is appropriate for a single year visual assessment of practices such as tillage management. The reliability of this method is based on the sampling and inspection methods and the training and independence of the inspectors. Transect surveys as a visual verification method are not considered an adequate method for verifying non-visual BMPs, or multi-year visual BMPs which require direct inspection, office/farm records, or certified training and engineering.

[5] Federal NPDES Program requirements for CAFO compliance evaluation programs are available in section 40 CFR123.26 (b) (1-2) of the federal regulations.

4d. Agency-sponsored Surveys

A survey of a statistical sampling of farms. Limitations on the reliability of data are similar to those for farm inventory and office/farm records. Periodic surveys and associated reports published by the National Agricultural Statistics Service (NASS), Conservation Effects Assessment Program (CEAP) and Natural Resources Inventory (NRI) are examples of this type of survey.

4e. Remote Sensing

A science-based review of images or photographic signatures verified through aerial photography, satellite imagery, or similar methods to identify physical practices on the landscape. This method may involve site-by-site imaging or statistical sampling. Implementing a sufficient land-based sampling validation protocol is necessary for ensuring the analysis of the remote images or photographic signatures are calibrated to actual conditions.

Part 5: Agricultural BMP Verification Priorities

The CBP's BMP Verification Committee and the BMP Verification Review Panel have acknowledged the potential financial and technical limitations that exist when seeking to fully implement the elements of this verification guidance. For this reason, public and private entities engaged with agricultural BMP verification are encouraged to direct their verification efforts in direct proportion to the environmental benefits that a BMP contributes towards the TMDL pollutant reduction for a jurisdiction's agricultural source sector. Agricultural BMPs that result in the highest pollutant reductions for each jurisdiction's agricultural source sector should correspondingly be the highest priority for implementing statistically significant verification protocols.

The Jurisdictional Agriculture Verification Protocol Design Table described in the following section (Tables 4-6) provides specific guidance to identify the default levels of verification inspections by agricultural BMP category (Visual – 1 year, Visual – multi-year, and Non-Visual). Tracked and reported BMPs achieving greater than 5% of the jurisdiction's agricultural sector nutrient and/or sediment load reductions as estimated in the most recent progress scenario should receive the highest level of verification rigor. Those BMPs calculated to achieve ≤5 % of the jurisdiction's agricultural sector nutrient and/or sediment load reductions as estimated in the most recent progress scenario, can be verified with less rigor.

Part 6: Jurisdictional Agricultural Verification Protocol Design Table and Supplementary Information

The CBP's Jurisdictional Agriculture Verification Protocol Design Table provides the jurisdictions, the CBP and public with a streamlined guidance and overview of the default verification levels for agricultural BMP verification (Tables 4-6), supplementary to the "Chesapeake Bay Program Best Management Practice Verification Program Design Matrix" and the "State Protocol Components Checklist" provided in the draft basin-wide framework report by the CBP. The elements of the Jurisdictional Agricultural Verification Protocol Design Table follow:

6a. BMP Priority

As described within the draft basin-wide verification framework report, jurisdictions can choose to vary the level of verification based on the relative importance of a specific practice to achieving the jurisdiction's agricultural sector nutrient and/or sediment load reductions as estimated in the most recent progress scenario. By clearly documenting the relative load reduction priority for a BMP or group of closely related BMPs, a jurisdiction can target its verification investments to those BMPs which provide the greatest pollution reductions, or are employed the most often.

6b. BMP Grouping

Jurisdictions do not need to develop and document detailed protocols for individual BMPs across the universe of BMPs that they track, verify, and report for nutrient and sediment reduction load credit. Instead, jurisdictions should take their complete listing of tracked and reported BMPs and organize them by the categories that best account for the jurisdiction's agricultural sector nutrient and/or sediment load reductions as estimated in the most recent progress scenario, in logical groupings of the data specific to the jurisdiction, and consideration of the BMP types described in the relevant Agriculture Verification Guidance. Then, as presented within the Jurisdictional Agricultural Verification Protocol Design Table, the jurisdiction would document the appropriate protocols and procedures followed for each logical grouping of BMPs.

6c. Initial Inspection and Follow-up Checks

The Jurisdictional Agricultural Verification Protocol Design Table illustrates the CBP partners' BMP Verification Review Panel's recommendation to the jurisdictions for structuring their verification programs to carry out an initial inspection for answering the question "is the BMP there?" and then follow-up checks carried out at the appropriate frequency to answer the question "is the BMP still there and operating" throughout the lifespan of the practice.

6d. Lifespan and Sunsetting Practices

The Jurisdictional Agricultural Verification Protocol Design Table prompts jurisdictions to provide documentation on procedures in place for conducting follow-up checks of BMPs at the end of their approved contractual, permitted or physical lifespan. Jurisdictions would also document procedures for removing BMPs which will not go beyond their lifespans and do not require follow-up checks to confirm the BMP is still present and operational.

6e. Data Quality Assuring, Recording, and Reporting

This section documents the systems and processes utilized by the jurisdictions to confirm that initial inspections and follow-up checks were conducted, to prevent double counting, and to ensure quality assurance of the reported data prior to acceptance by the jurisdiction. Because BMP data will likely be reported to a jurisdiction from multiple sources in addition to the state agencies, written procedures are necessary to assure the quality of the data accepted by the jurisdiction. Any additional steps taken in properly recording the accepted data prior to its reporting through the jurisdiction's NEIEN node should also be documented.

Part 7: Guidance for Development of an Agricultural Practice Verification Protocol

The guidance provided within Sections 2 – 6 above will enable the jurisdictions to select and tailor the verification for agricultural practices that best suits their respective BMP priorities while ensuring conformity in terms (definitions), choices for methods, and approaches basin-wide. Jurisdictions should refer to the *State Protocol Component Checklist*[6] for the key elements of a complete state verification protocol process. If a jurisdiction decides to eliminate a component because it is unnecessary for its state process, it should provide documentation for why that component was deleted.

Once jurisdictions have identified the BMP priorities and BMP groupings, the specific verification methodologies that the state intends to use should be established and documented including the appropriate personnel (training or qualifications) for conducting the data collection, reporting, and verification process.

Jurisdictions will select methods of documentation that provide adequate information about the BMP to enable independent spot-checks by appropriately trained individuals. Jurisdictions will also develop an appropriate statistical selection process with the recommended review cycles of BMP implementation in their State Quality Assurance Plan.

Independent verification of BMP reporting programs and BMP implementation data will be addressed in state verification protocols. The State Quality Assurance Plans will ensure that the reported data is valid and representative of BMP implementation in the state. Independent verification can be conducted by agency personnel or qualified third parties, as long as they are trained to accurately assess BMP implementation data. Quality assurance personnel should be independent reviewers as defined by the Chesapeake Bay Program partners.

All reported BMPs, whether non-cost shared, cost shared, regulatory or permit-required, should have distinct, CBP-approved definitions, appropriate design standards and/or indicators to enable accurate, reliable reporting of the BMP to receive the commensurate credit.

Jurisdictions will develop a method to review data reported to the NEIEN submission system to ensure that it was accurately entered and submitted according to CBP guidance documents. If BMP implementation information reported by states comes from external entities it will be subject to appropriate validation as required by the CBP.

Jurisdictions will develop a methodology to determine when and how to remove data from their BMP reporting system. Long term historical BMP's should have a distinct life spans where they are either re-verified or removed from the reporting system.

Part 8: Supplemental Assistance for Development of an Agricultural Practice Verification Protocol

Because a single verification method will not be relevant to all BMPs, or even across a single category of BMPs, jurisdictions will need to carefully evaluate the resources available for verification and the relative priority or significance of the BMPs it expects to verify. To assist jurisdictions, the Agriculture Workgroup has developed detailed supplemental matrices for the categories of agricultural BMPs described in Part 2:

- Visual Assessment BMPs - Single Year (Table 4)

[6] The full State Protocol Component Checklist is provided in Table 11 in Section 14.

- Visual Assessment BMPs - Multi-Year (Table 5), and
- Non-Visual Assessment BMPs (Table 6).

The supplementary matrices, Tables B-6 through B-8, which are arranged by type of verification method, provide additional detail of specific verification methods and their applicability of use for providing verification and reliability factors as determined by the implementation mechanisms. These tables supplement Tables B-3 through B-5, which provide an overview of verification for each of the three primary BMP categories. Tables B-3 through B-5 include a specific example for each BMP category.

Table B-2. Descriptions of the BMP performance measures provided by Supplementary Matrices for Jurisdictional Use.

BMP Performance Measure	**Description**
BMP detection	Can the practice be physically detected through visual or other assessment methods such as sample analysis, historic images or photographic signatures, or farm and office records.
Meets USDA/State/CBP design specifications	Those practices which are designed and implemented according to applicable federal or state standards which typically form the basis for assigning relative environmental benefits by the Chesapeake Bay Program partners.
Meets federal/state/CBP operation and maintenance (O&M) specifications	Those practice which are being operated and maintained in accordance to applicable federal or state standards which typically form the basis for assigning relative environmental benefits by the Chesapeake Bay Program partners.
Resource Improvement (non-specification)	Those practices which provide similar annual environmental benefits for water quality but may not fully meet all the design criteria of existing governmental design standards.
Installation date	The installation date of the practice is important for determining the period of time it has provided environmental benefits, and if those benefits should be reported for credit, or have been previously accounted for in the Chesapeake Bay Program partners' calibrated modeling tools.
Expiration date	The expiration date of the may refer to the physical effective lifespan of the practice such as the expiration of a management plan, or may refer to the expiration of the associated permit or contract, which could necessitate the use of an alternative verification assessment method for further crediting.

Table B-3. Jurisdictional Agriculture Verification Protocol Design Table: Visual Assessment BMPs—Single Year

Chesapeake Bay Program Agriculture Workgroup

July 28, 2014

A. BMP Priority	B. Data Grouping	C. BMP Type	D. Initial Inspection (*Is the BMP there?*)				E. Follow-up Check (*Is the BMP still there?*)			F. Lifespan/ Sunset (*Is the BMP no longer there?*)	G. Data QA, Recording & Reporting
			Method	Frequency	Who inspects	Documentation	Follow-up Inspection	Statistical Sub-sample	Response if Problem		
High / Low	Visual Assessment: Single Year	Non-Cost Shared BMPs	**On-Site Visual Assessment (Limited Statistical Sampling)**	100% of All Tracked & Reported BMPs	Trained and certified technical agency/NGO field staff or engineers	BMPs meet appropriate government and/or CBP practice standards	Single Year	10%[1] / 5%[2] QA of All Tracked & Reported BMPs (within the year)	Bring into compliance within one year or less, or remove from reported BMPs	Single Year	Document inspections/follow-up checks, prevent double counting, and QA reported data
High / Low	Visual Assessment: Single Year	Cost-Shared Programs	On-Site Visual Assessment Only	100% of All Tracked & Reported BMPs	Trained and certified technical agency/NGO field staff or engineers	BMPs meet appropriate government and/or CBP practice standards	Single Year	10% / 5% QA of All Active Contractual BMPs (within the year)	Bring into compliance within one year or less, or remove from reported BMPs	Single Year	Document inspections/follow-up checks, prevent double counting, and QA reported data

High / Low	Visual Assessment: Single Year	Permit-Issuing Programs	On-Site Visual Assessment Only	100% of All Tracked & Reported BMPs	Trained and certified technical agency field staff or engineers	BMPs meet the appropriate government and/or CBP practice standards	Single Year	20% Annually of All Active Permits	Bring into compliance within one year or less, or remove from reported BMPs	Single Year	Document inspections/follow-up checks, prevent double counting, and QA reported data
EXAMPLE BMP	Visual Assessment: Single Year	Cost-Shared Programs: Traditional Cover Crop-Early Drilled Rye	On-Site Visual Assessment: Cover Crop Establishment	100% of All Active Contracts	County Conservation District USDA-NRCS Certified Field Technician	Cost-Share Program BMP Certification Form	On-Site Visual Assessment: Cover Crop Termination	10% QA of All Active Contractual BMPs	Cost-Share Program Contract Compliance Policy	Contract Year	Cost-Share Program Documentation / 10% QAQC Compliance Checks by State Agency / Tracking & Reporting Protocol

Table B-4. Jurisdictional Agriculture Verification Protocol Design Table: Visual Assessment BMPs—Multi-Year
Chesapeake Bay Program Agriculture Workgroup
July 28, 2014

A. BMP Priority	B. Data Grouping	C. BMP Type	D. Initial Inspection (*Is the BMP there?*)				E. Follow-up Check (*Is the BMP still there?*)			F. Lifespan/ Sunset (*Is the BMP no longer there?*)	G. Data QA, Recording & Reporting
			Method	Frequency	Who inspects	Documentation	Follow-up Inspection	Statistical Sub-sample	Response if Problem		
High / Low	Visual Assessment: Multi-Year	Non-Cost Shared BMPs	**On-Site Visual Assessment (Limited Statistical Sampling)**	100% of All Tracked & Reported BMPs	Trained and certified technical agency/NGO field staff or engineers	BMPs meet appropriate government and/or CBP practice standards	Multi-Year	10%[1] / 5%[2] Annually of All Tracked & Reported BMPs	Bring into compliance within one year or less, or remove from reported BMPs	Multi-Year	Document inspections/follow-up checks, prevent double counting, and QA reported data
High / Low	Visual Assessment: Multi-Year	Cost-Shared Programs	On-Site Visual Assessment Only	100% of All Tracked & Reported BMPs	Trained and certified technical agency/NGO field staff or engineers	BMPs meet appropriate government and/or CBP practice standards	Multi-Year	10% / 5% of All Active Contractual BMPs	Bring into compliance within one year or less, or remove from reported BMPs	Multi-Year	Document inspections/follow-up checks, prevent double counting, and QA reported data

High / Low	Visual Assessment: Multi-Year	Permit-Issuing Programs	On-Site Visual Assessment Only	100% of All Tracked & Reported BMPs	Trained and certified technical agency field staff or engineers	BMPs meet the appropriate government and/or CBP practice standards	Multi-Year	20% Annually of All Active Permits	Bring into compliance within one year or less, or remove from reported BMPs	Multi-Year	Document inspections/follow-up checks, prevent double counting, and QA reported data
EXAMPLE BMP	Visual Assessment: Multi-Year	State CAFO Permit Program: Animal Waste Storage Structure	On-Site Visual Assessment: Initial CAFO Permit Inspection	100% of All Active CAFO Permits	State Agency CAFO Certified Inspector	State CAFO Permit Inspection Certification Form	On-Site Visual Assessment: State CAFO Permit Compliance Inspection	20% of All Active CAFO Permits	State CAFO Program Permit Compliance Policy	State CAFO Permit Lifespan: 5 Years	State CAFO Program Documentation / 5% QAQC Compliance Checks by EPA / Tracking & Reporting Protocol

[1]BMP High: Default verification levels for follow-up sub-sampling of BMPs which are known to collectively account for greater than 5% of a jurisdiction's agricultural sector nutrient and/or sediment load reductions as estimated in the most recent progress scenario.
[2] BMP Low: Default verification levels for follow-up sub-sampling of BMPs which are known to collectively account for equal to or less than 5% of a jurisdiction's agricultural sector nutrient and/or sediment load reductions as estimated in the most recent progress scenario.

Table B-5. Jurisdictional Agriculture Verification Protocol Design Table: Non-Visual Assessment BMPs
Chesapeake Bay Program Agriculture Workgroup
July 28, 2014

A. BMP Priority	B. Data Grouping	C. BMP Type	D. Initial Inspection (*Is the BMP there?*)				E. Follow-up Check (*Is the BMP still there?*)			F. Life-span / Sunset (*Is the BMP no longer there?*)	G. Data QA, Recording & Reporting
			Method	Frequency	Who inspects	Documentation	Follow-up Inspection	Statistical Sub-sample	Response if Problem		
High / Low	Non-Visual Assessment	Non-Cost Shared BMPs	On-Site Non-Visual Assessment Only	100% of All Tracked & Reported BMPs	Trained and certified technical agency/NGO field staff or engineers	BMPs meet the appropriate government and/or CBP practice standards	Single Year	10%[1] / 5%[2] Annually of All Tracked & Reported BMPs	Bring into compliance within one year or less, or remove from reported BMPs	Single Year	Document inspections/follow-up checks, prevent double counting, and QA reported data
High / Low	Non-Visual Assessment	Cost-Shared Programs	On-Site Non-Visual Assessment Only	100% of All Tracked & Reported BMPs	Trained and certified technical agency/NGO field staff or engineers	BMPs meet the appropriate government and/or CBP practice standards	Single Year	10% / 5% of All Active Contractual BMPs	Bring into compliance within one year or less, or remove from reported BMPs	Single Year	Document initial inspections/follow-up checks, prevent double counting, and QA reported data

High / Low	Non-Visual Assessment	Regulatory Programs	On-Site Non-Visual Assessment Only	100% of All Tracked & Reported BMPs	Trained and certified technical agency field staff or engineers	BMPs meet the appropriate government and/or CBP practice standards	Single Year	10% / 5% Annually of All Tracked & Reported BMPs	Bring into compliance within one year or less, or remove from reported BMPs	Single Year	Document initial inspections/follow-up checks, prevent double counting, and QA reported data
High / Low	Non-Visual Assessment	Permit-issuing Programs	On-Site Non-Visual Assessment Only	100% of All Tracked & Reported BMPs	Trained and certified technical agency field staff or engineers	BMPs meet the appropriate government and/or CBP practice standards	Single Year	20% Annually of All Active Permits	Bring into compliance within one year or less, or remove from reported BMPs	Single Year	Document initial inspections/follow-up checks, prevent double counting, and QA reported data
EXAMPLE BMP	Non-Visual Assessment	State Regulatory Programs: Nutrient Application Management	On-Site Non-Visual Assessment: Nutrient Management Plan Implementation	100% of All Tracked & Reported Nutrient Application Management Plans	County Conservation District Technician - State Nutrient Management Program Certified	State Nutrient Management Program Certification Form	On-Site Non-Visual Assessment: Nutrient Application Management O&M Compliance	10% of All Tracked & Reported Nutrient Application Management Plans	State Nutrient Management Regulatory Compliance Policy	3 Year Plans	State Nutrient Management Program Documentation / 5% QAQC Compliance Checks by State Agency / Tracking & Reporting Protocol

Table B-6. Agricultural BMP Verification Guidance Matrix: Visual Assessment BMPs – Single Year

Chesapeake Bay Program Agriculture Workgroup

The following BMP verification methods have been identified by the Agriculture Workgroup as representing primary pathways for BMP verification and reporting being utilized by the Bay Program partners. The associated opportunities and limitations inherent for each method and BMP category type represent the current level of confidence that a sufficient level of verification can be implemented to ensure that the BMPs have been (1) implemented, are currently operational, and are being maintained to meet the BMP definition and relevant practice standards and requirements; and (2) be in compliance with the Chesapeake Bay Program partners' BMP Verification Principles, including any supporting addendums.

Visual Assessment BMPs - Single Year: Conservation Tillage; High-Residue Minimum Soil Disturbance; Cover Crops; Commodity Cover Crops / **Interim BMPs-** Dairy Manure Injection; Annual No-till; Poultry Litter Injection

Agricultural BMP Verification Methods	Assessment Methods	Verification Expectations	Visual Assessment BMPs - Single Year	Cost-Sharing Information					BMP Performance					
				Federal C/S	State C/S	NGO C/S	Private Funded	Previously C/S BMPs (Expired Contract)	BMP Detection	Meets USDA/ State Design Specs	Meets Federal/State O&M Specs	Resource Improvement (Non-Spec)	Installation Date (M/Y)	Expiration Date (M/Y)
1.) Permit Issuing Programs	Verified compliance with federal NPDES (CAFO) or state agricultural operational permit program requirements.	Annual frequency of permit compliance inspections for all or sufficient statistical percentage of permitted operations during permit life span. Review of office/farm records.	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Non-Applicable	Eligible	Eligible

2.) Regulatory Programs	Verified compliance with federal or state agricultural regulatory requirements (non-operational permit).	Annual frequency of regulatory compliance inspections for all or sufficient statistical percentage of regulated operations. Review of office/farm records.	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Non-Applicable	Eligible	Eligible
3.) Financial Incentive Programs	Verified compliance with federal program contractual requirements.	Annual frequency of contractual compliance inspections for all or sufficient statistical percentage of contracted operations during contractual life span. Review of office/farm records.	Eligible	Eligible	Potentially Eligible	Potentially Eligible	Not Eligible	Not Eligible	Eligible	Eligible	Eligible	Non-Applicable	Eligible	Eligible
4.) Financial Incentive Programs	Verified compliance with state or county program contractual requirements.	Annual frequency of contractual compliance inspections for all or sufficient statistical percentage of contracted operations during contractual life span. Review of office/farm records.	Eligible	Potentially Eligible	Eligible	Potentially Eligible	Not Eligible	Not Eligible	Eligible	Eligible	Eligible	Non-Applicable	Eligible	Eligible

5.) Financial Incentive Programs	Verified compliance with NGO program contractual requirements.	Annual frequency of contractual compliance inspections for all or sufficient statistical percentage of contracted operations during contractual life span. Review of office/farm records.	Eligible	Potentially Eligible	Potentially Eligible	Eligible	Not Eligible	Not Eligible	Eligible	Potentially Eligible	Potentially Eligible	Non-Applicable	Eligible	Eligible
6.) Farm Inventory	Farm inventory by trained and certified federal, state, and/or county agency personnel.	Annual frequency of inventories for all or sufficient statistical percentage of operations during BMP life span. Review of office/farm records.	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Non-Applicable	Eligible	Eligible
7.) Farm Inventory	Farm inventory by trained and certified NGO personnel.	Annual frequency of inventories for all or sufficient statistical percentage of operations during BMP life span. Review of office/farm records.	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Non-Applicable	Eligible	Eligible
8.) Farm Inventory	Farmer completes self-certified inventory survey and trained and certified federal, state and/or county personnel verify on-site.	Annual frequency of inventories for all or sufficient statistical percentage of operations during BMP life span. Review of office/farm records.	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Non-Applicable	Eligible	Eligible

9.) Farm Inventory	Farmer completes self-certified inventory survey and trained and certified NGO personnel verify on-site.	Annual frequency of inventories for all or sufficient statistical percentage of operations during BMP life span. Review of office/farm records.	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Non-Applicable	Eligible	Eligible
10.) Farm Inventory	Farmer completes in-office self-certified inventory with assistance of trained and certified federal, state and/or county agency personnel. No on-site verification.	Annual frequency of inventories for all or sufficient statistical percentage of operations during BMP life span. Review of office/farm records.	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Potentially Eligible	Not Eligible	Not Eligible	Non-Applicable	Potentially Eligible	Potentially Eligible
11.) Farm Inventory	Farmer completes in-office self-certified inventory with assistance of trained and certified NGO personnel. No on-site verification.	Annual frequency of inventories for all or sufficient statistical percentage of operations during BMP life span. Review of office/farm records.	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Potentially Eligible	Not Eligible	Not Eligible	Non-Applicable	Potentially Eligible	Potentially Eligible
12.) Farm Inventory	Farmer with training and certification completes self-certified inventory survey.	Annual frequency of inventories for all or sufficient statistical percentage of operations during BMP life span.	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Potentially Eligible	Not Eligible	Not Eligible	Non-Applicable	Potentially Eligible	Potentially Eligible

13.) Farm Inventory	Farmer without training and certification completes self-certified inventory survey.	Annual frequency of inventories for all or sufficient statistical percentage of operations during BMP life span.	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Potentially Eligible	Not Eligible	Not Eligible	Non-Applicable	Potentially Eligible	Potentially Eligible
14.) Office Records	Review of existing office records by trained and certified federal, state and/or county agency personnel. No on-site verification.	Annual frequency of office records review and verification for all or sufficient statistical percentage of operations during BMP life span.	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Potentially Eligible	Not Eligible	Not Eligible	Non-Applicable	Potentially Eligible	Potentially Eligible
15.) Farm Records	Review of existing on-farm records by trained and certified federal, state and/or county agency personnel. No on-site verification.	Annual frequency of on-farm records review and verification for all or sufficient statistical percentage of operations during BMP life span.	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Potentially Eligible	Not Eligible	Not Eligible	Non-Applicable	Potentially Eligible	Potentially Eligible
16.) Farm Records	Review of existing on-farm records by trained and certified NGO personnel. No on-site verification.	Annual frequency of on-farm records review and verification for all or sufficient statistical percentage of operations during BMP life span.	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Potentially Eligible	Not Eligible	Not Eligible	Non-Applicable	Potentially Eligible	Potentially Eligible
17.) Transect Survey	Statistically designed and recognized transect survey completed by trained and certified federal, state and/or county personnel.	Annual frequency of statistical transect surveys for a sufficient statistical percentage of operations during BMP life span.	Potentially Eligible	Potentially Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Non-Applicable	Potentially Eligible	Potentially Eligible

18.) Transect Survey	Statistically designed and recognized transect survey completed by trained and certified NGO personnel.	Annual frequency of statistical transect surveys for a sufficient statistical percentage of operations during BMP life span.	Potentially Eligible	Potentially Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Non-Applicable	Potentially Eligible	Potentially Eligible
19.) CEAP Survey	CEAP statistical survey conducted in-person at field-level scale following NASS verification protocols.	Non-annual frequency of statistical CEAP surveys for a sufficient statistical percentage of operations during BMP life span may limit verification.	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Non-Applicable	Potentially Eligible	Potentially Eligible
20.) NASS Survey	NASS statistical survey conducted at farm-level scale following NASS verification protocols.	Annual frequency of statistical NASS surveys for all or sufficient statistical percentage of operations during BMP life span.	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Non-Applicable	Potentially Eligible	Potentially Eligible
21.) NRI Point (NRCS) or some other statistically selected sites	Statistical survey conducted in-person at field-level with NASS trained and certified personnel.	Non-annual frequency of statistical NRI surveys for a sufficient statistical percentage of operations during BMP life span may limit verification.	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Non-Applicable	Potentially Eligible	Potentially Eligible

22.) Remote Sensing	Statistically designed and recognized remote sensing surveys with supporting field-level scale ground-truthing verification.	Annual frequency of statistical remote sensing surveys implemented by trained and certified agency personnel, for all or sufficient statistical percentage of operations during BMP life span.	Potentially Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Potentially Eligible	Not Eligible	Not Eligible	Non-Applicable	Potentially Eligible	Potentially Eligible
23.) Remote Sensing	Statistically designed and recognized remote sensing surveys with supporting field-level scale ground-truthing verification.	Annual frequency of statistical remote sensing surveys implemented by trained and certified NGO personnel, for all or sufficient statistical percentage of operations during BMP life span.	Potentially Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Potentially Eligible	Not Eligible	Not Eligible	Non-Applicable	Potentially Eligible	Potentially Eligible

Table B-7 Draft Agricultural BMP Verification Guidance Matrix: Visual Assessment BMPs – Multi-Year

Chesapeake Bay Program Agriculture Workgroup

The following BMP verification methods have been identified by the Agriculture Workgroup as representing primary pathways for BMP verification and reporting being utilized by the Bay Program partners. The associated opportunities and limitations inherent for each method and BMP category type represent the current level of confidence that a sufficient level of verification can be implemented to ensure that the BMPs have been (1) implemented, are currently operational, and are being maintained to meet the BMP definition and relevant practice standards and requirements; and (2) be in compliance with the Chesapeake Bay Program partners' BMP Verification Principles, including any supporting addendums.

Visual Assessment BMPs - Multi-Year: Animal Waste Management Systems; Barnyard Runoff Control; Bio-filters; Continuous No-Till; Forest Buffers; Grass Buffers; Land Retirement; Steam-Side Forest Buffers; Stream-Side Grass Buffers; Stream-Side Wetland Restoration; Tree Planting; Lagoon Covers; Loafing Lot Management; Mortality Composters; Non-Urban Stream Restoration: Shoreline Erosion Control; Off-Steam Watering w/o Fencing; Stream Access Control with Fencing; Prescribed Grazing; Precision Intensive Rotational Grazing; Horse Pasture Management; Pasture Alternate Watering Systems; Soil Conservation & Water Quality Plan Elements; Water Control Structures; Wetland Restoration / **Interim BMPs-** Alternative Crops; Dirt & Gravel Road Erosion & Sediment Control; Cropland Irrigation Management; Irrigation Water Capture Reuse; P-Sorbing Materials in Ag Ditches; Vegetative Environmental Buffers- Poultry

Agricultural BMP Verification Methods	Assessment Methods	Verification Expectations	Visual Assessment BMPs - Multi-Year	Cost-Sharing Information					BMP Performance					
				Federal C/S	State C/S	NGO C/S	Private Funded	Previously C/S BMPs (Expired Contract)	BMP Detection	Meets USDA/ State Design Specs	Meets Federal/State O&M Specs	Resource Improvement (Non-Spec)	Installation Date (M/Y)	Expiration Date (M/Y)

1.) Permit Issuing Programs	Verified compliance with federal NPDES (CAFO) or state agricultural operational permit program requirements.	Non-annual frequency of permit compliance inspections for all or sufficient statistical percentage of permitted operations during permit life span. Review of office/farm records.	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Not Eligible	Eligible	Eligible
2.) Regulatory Programs	Verified compliance with federal or state agricultural regulatory requirements (non-operational permit).	Non- annual frequency of regulatory compliance inspections for all or sufficient statistical percentage of regulated operations. Review of office/farm records.	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Not Eligible	Eligible	Eligible
3.) Financial Incentive Programs	Verified compliance with federal program contractual requirements.	Non- annual frequency of contractual compliance inspections for all or sufficient statistical percentage of contracted operations during contractual life span. Review of office/farm records.	Eligible	Eligible	Potentially Eligible	Potentially Eligible	Not Eligible	Not Eligible	Eligible	Eligible	Eligible	Not Eligible	Eligible	Eligible

4.) Financial Incentive Programs	Verified compliance with state or county program contractual requirements.	Non-annual frequency of contractual compliance inspections for all or sufficient statistical percentage of contracted operations during contractual life span. Review of office/farm records.	Eligible	Potentially Eligible	Eligible	Potentially Eligible	Not Eligible	Not Eligible	Eligible	Eligible	Eligible	Potentially Eligible	Eligible	Eligible
5.) Financial Incentive Programs	Verified compliance with NGO program contractual requirements.	Non-annual frequency of contractual compliance inspections for all or sufficient statistical percentage of contracted operations during contractual life span. Review of office/farm records.	Eligible	Potentially Eligible	Potentially Eligible	Eligible	Not Eligible	Not Eligible	Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Eligible	Eligible
6.) Farm Inventory	Farm inventory by trained and certified federal, state, and/or county agency personnel.	Non-annual frequency of inventories for all or sufficient statistical percentage of operations during BMP life span. Review of office/farm records.	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible
7.) Farm Inventory	Farm inventory by trained and certified NGO personnel.	Non-annual frequency of inventories for all or sufficient statistical percentage of operations during BMP life span. Review of office/farm records.	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible

8.) Farm Inventory	Farmer completes self-certified inventory survey and trained and certified federal, state and/or county personnel verify on-site.	Non-annual frequency of inventories for all or sufficient statistical percentage of operations during BMP life span. Review of office/farm records.	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible
9.) Farm Inventory	Farmer completes self-certified inventory survey and trained and certified NGO personnel verify on-site.	Non-annual frequency of inventories for all or sufficient statistical percentage of operations during BMP life span. Review of office/farm records.	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible
10.) Farm Inventory	Farmer completes in-office self-certified inventory with assistance of trained and certified federal, state and/or county agency personnel. No on-site verification.	Non-annual frequency of inventories for all or sufficient statistical percentage of operations during BMP life span. Review of office/farm records.	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Potentially Eligible	Not Eligible	Not Eligible	Not Eligible	Potentially Eligible	Potentially Eligible
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12.) Farm Inventory	Farmer with training and certification completes self-certified inventory survey.	Non-annual frequency of inventories for all or sufficient statistical percentage of operations during BMP life span.	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Potentially Eligible	Not Eligible	Not Eligible	Not Eligible	Potentially Eligible	Potentially Eligible
13.) Farm Inventory	Farmer without training and certification completes self-certified inventory survey.	Non-annual frequency of inventories for all or sufficient statistical percentage of operations during BMP life span.	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Potentially Eligible	Not Eligible	Not Eligible	Not Eligible	Potentially Eligible	Potentially Eligible
14.) Office Records	Review of existing office records by trained and certified federal, state and/or county agency personnel. No on-site verification.	Non-annual frequency of office records review and verification for all or sufficient statistical percentage of operations during BMP life span.	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Potentially Eligible	Not Eligible	Not Eligible	Not Eligible	Potentially Eligible	Potentially Eligible
15.) Farm Records	Review of existing on-farm records by trained and certified federal, state and/or county agency personnel. No on-site verification.	Non-annual frequency of on-farm records review and verification for all or sufficient statistical percentage of operations during BMP life span.	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Potentially Eligible	Not Eligible	Not Eligible	Not Eligible	Potentially Eligible	Potentially Eligible
16.) Farm Records	Review of existing on-farm records by trained and certified NGO personnel. No on-site verification.	Non-annual frequency of on-farm records review and verification for all or sufficient statistical percentage of operations during BMP life span.	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Potentially Eligible	Not Eligible	Not Eligible	Not Eligible	Potentially Eligible	Potentially Eligible

17.) Transect Survey	Statistically designed and recognized transect survey completed by trained and certified federal, state and/or county personnel.	Non-annual frequency of statistical transect surveys for a sufficient statistical percentage of operations during BMP life span.	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible
18.) Transect Survey	Statistically designed and recognized transect survey completed by trained and certified NGO personnel.	Non-annual frequency of statistical transect surveys for a sufficient statistical percentage of operations during BMP life span.	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible
19.) CEAP Survey	CEAP statistical survey conducted in-person at field-level scale following NASS verification protocols.	Non-annual frequency of statistical CEAP surveys for a sufficient statistical percentage of operations during BMP life span may limit verification.	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible
20.) NASS Survey	NASS statistical survey conducted at farm-level scale following NASS verification protocols.	Non-annual frequency of statistical NASS surveys for all or sufficient statistical percentage of operations during BMP life span.	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible
21.) NRI Point (NRCS) or some other statistically selected sites	Statistical survey conducted in-person at field-level with NASS trained and certified personnel.	Non-annual frequency of statistical NRI surveys for a sufficient statistical percentage of operations during BMP life span may limit verification.	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible

22.) Remote Sensing	Statistically designed and recognized remote sensing surveys with supporting field-level scale ground-truthing verification.	Non-annual frequency of statistical remote sensing surveys implemented by trained and certified agency personnel, for all or sufficient statistical percentage of operations during BMP life span.	Potentially Eligible	Not Eligible	Not Eligible	Not Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Not Eligible	Not Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible
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Table B-8 Draft Agricultural BMP Verification Guidance Matrix: Non-Visual Assessment BMPs

Chesapeake Bay Program Agriculture Workgroup

The following BMP verification methods have been identified by the Agriculture Workgroup as representing primary pathways for BMP verification and reporting being utilized by the Bay Program partners. The associated opportunities and limitations inherent for each method and BMP category type represent the current level of confidence that a sufficient level of verification can be implemented to ensure that the BMPs have been (1) implemented, are currently operational, and are being maintained to meet the BMP definition and relevant practice standards and requirements; and (2) be in compliance with the Chesapeake Bay Program partners' BMP Verification Principles, including any supporting addendums.

Non-Visual Assessment BMPs: Dairy Precision Feeding; Swine Phytase; Poultry Litter Transport; Poultry Litter Treatment; Poultry Phytase; Decision/Precision Ag, Enhanced Nutrient Management; Nutrient Application Management; Soil Conservation & Water Quality Plans

Agricultural BMP Verification Methods	Assessment Methods	Verification Expectations	Non-Visual Assessment BMPs	Cost-Sharing Information					BMP Performance					
				Federal C/S	State C/S	NGO C/S	Private Funded	Previously C/S BMPs (Expired Contract)	BMP Detection	Meets USDA/ State Design Specs	Meets Federal/State O&M Specs	Resource Improvement (Non-Spec)	Installation Date (M/Y)	Expiration Date (M/Y)
1.) Permit Issuing Programs	Verified compliance with federal NPDES (CAFO) or state agricultural operational permit program requirements.	Annual frequency of permit compliance inspections for all or sufficient statistical percentage of permitted operations during permit life span. Review of office/farm records.	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Non-Applicable	Potentially Eligible	Potentially Eligible

2.) Regulatory Programs	Verified compliance with federal or state agricultural regulatory requirements (non-operational permit).	Annual frequency of regulatory compliance inspections for all or sufficient statistical percentage of regulated operations. Review of office/farm records.	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Non-Applicable	Potentially Eligible	Potentially Eligible
3.) Financial Incentive Programs	Verified compliance with federal program contractual requirements.	Annual frequency of contractual compliance inspections for all or sufficient statistical percentage of contracted operations during contractual life span. Review of office/farm records.	Eligible	Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Eligible	Eligible	Eligible	Non-Applicable	Eligible	Eligible
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6.) Farm Inventory	Farm inventory by trained and certified federal, state, and/or county agency personnel.	Annual frequency of inventories for all or sufficient statistical percentage of operations during BMP life span. Review of office/farm records.	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Potentially Eligible	Non-Applicable	Potentially Eligible	Potentially Eligible
7.) Farm Inventory	Farm inventory by trained and certified NGO personnel.	Annual frequency of inventories for all or sufficient statistical percentage of operations during BMP life span. Review of office/farm records.	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Potentially Eligible	Non-Applicable	Potentially Eligible	Potentially Eligible
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18.) Transect Survey	Statistically designed and recognized transect survey completed by trained and certified NGO personnel.	Annual frequency of statistical transect surveys for a sufficient statistical percentage of operations during BMP life span.	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Non-Applicable	Not Eligible	Not Eligible
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22.) Remote Sensing	Statistically designed and recognized remote sensing surveys with supporting field-level scale ground-truthing verification.	Annual frequency of statistical remote sensing surveys implemented by trained and certified agency personnel, for all or sufficient statistical percentage of operations during BMP life span.	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Non-Applicable	Not Eligible	Not Eligible
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Relative Influence of BMPs To-Date on Load Reductions <u>Agriculture Sector</u>

Objectives

- Identify the agricultural BMPs reported by states to-date (through 2013 Progress) and quantify their relative contribution to nutrient and sediment load reductions from a No-Action condition to 2013 Progress.
- Results in the following slides are focused on the agricultural sector.

Method

- Create a NO ACTION Scenario.
- Determine load reductions between 2013 Progress Scenario and NO ACTION.
- Isolate each 2013 Progress BMP in a separate scenario using CAST processing rules.
- Determine load reductions from the isolated BMP scenario to the NO ACTION.
- Compare the relative load reductions among the BMPs.

Agriculture Practices

LandRetire	Land Retirement	PrecRotGrazing	Prescribed Grazing
ForestBuffers	Forest Buffers	UpPrecIntRotGraze	Precision Intensive Rotational Grazing
ConserveTill	Conservation Tillage	MortalityComp	Mortality Composting
CoverCrop	Cover Crop	EffNutManDecAgVA	Decision Agriculture
AWMS	Animal Waste Management Systems	ForestBuffersTrp	Forest Buffers on Fenced Pasture Corridor
GrassBuffers	Grass Buffers	NoTill	Continuous NoTill
EnhancedNM	Enhanced Nutrient Application Management	WaterContStruc	Water Control Structures
CarSeqAltCrop	Carbon Sequestration	Cropirrmgmt	Crop Irrigation Management
ConPlan	Conservation Plans	EffNutManEnhanceVA	Enhanced Nutrient Application Management
ComCovCrop	Commodity Cover Crop	NonUrbStrmRest	NonUrban Stream Restoration
WetlandRestore	Wetland Restoration	LoafLot	Loafing Lot Management
DecisionAg	Decision Agriculture	OSWnoFence	Pasture Alternative Watering
PastFence	Stream Access Control with Fencing	ConserveTillom	Conservation-Till Specialty Crops
GrassBuffersTrp	Grass Buffers on Fenced Pasture Corridor	TreePlantTrp	Tree Planting on Fenced Pasture Corridor
DairyPrecFeed	Dairy Precision Feeding	PoultryPhytase	Poultry Phytase
PoultryInjection	Poultry Injection	SwinePhytase	Swine Phytase
TreePlant	Tree Planting	BioFilters	BioFilters
CaptureReuse	Capture & Reuse	HorsePasMan	Horse Pasture Management
ManureTransport	Manure Transport	LagoonCovers	Lagoon Covers
ContinuousNT	Continuous NoTill	NutMan	Nutrient Application Management on Crop
BarnRunoffCont	Barnyard Runoff Control	Alum	Ammonia Emission Reductions (Alum)
LiquidInjection	Liquid Injection		

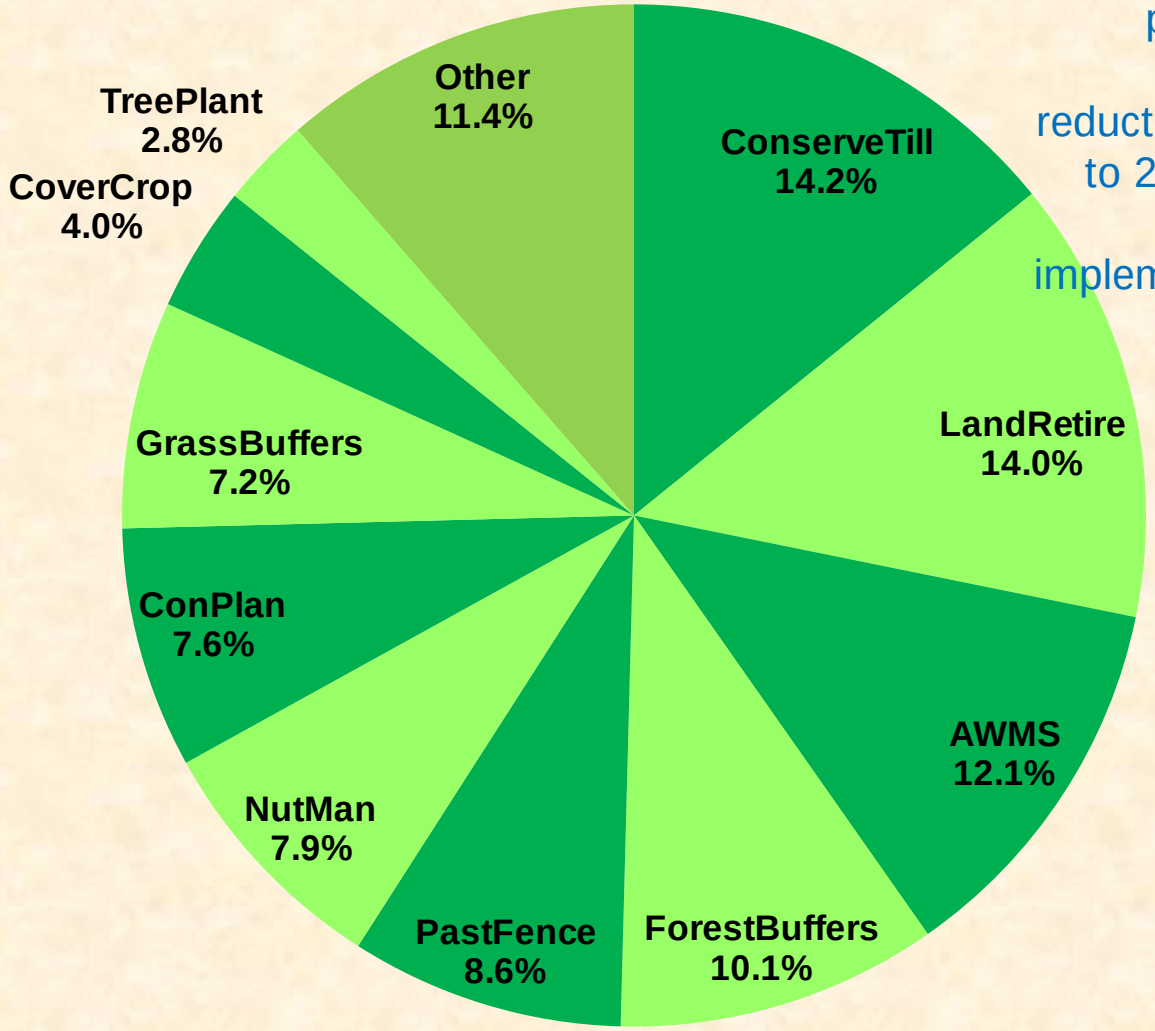
Agricultural Nitrogen Reductions

Relative influence of 2013 Progress BMPs on load reductions

Agriculture Nitrogen Load Reduction by BMP

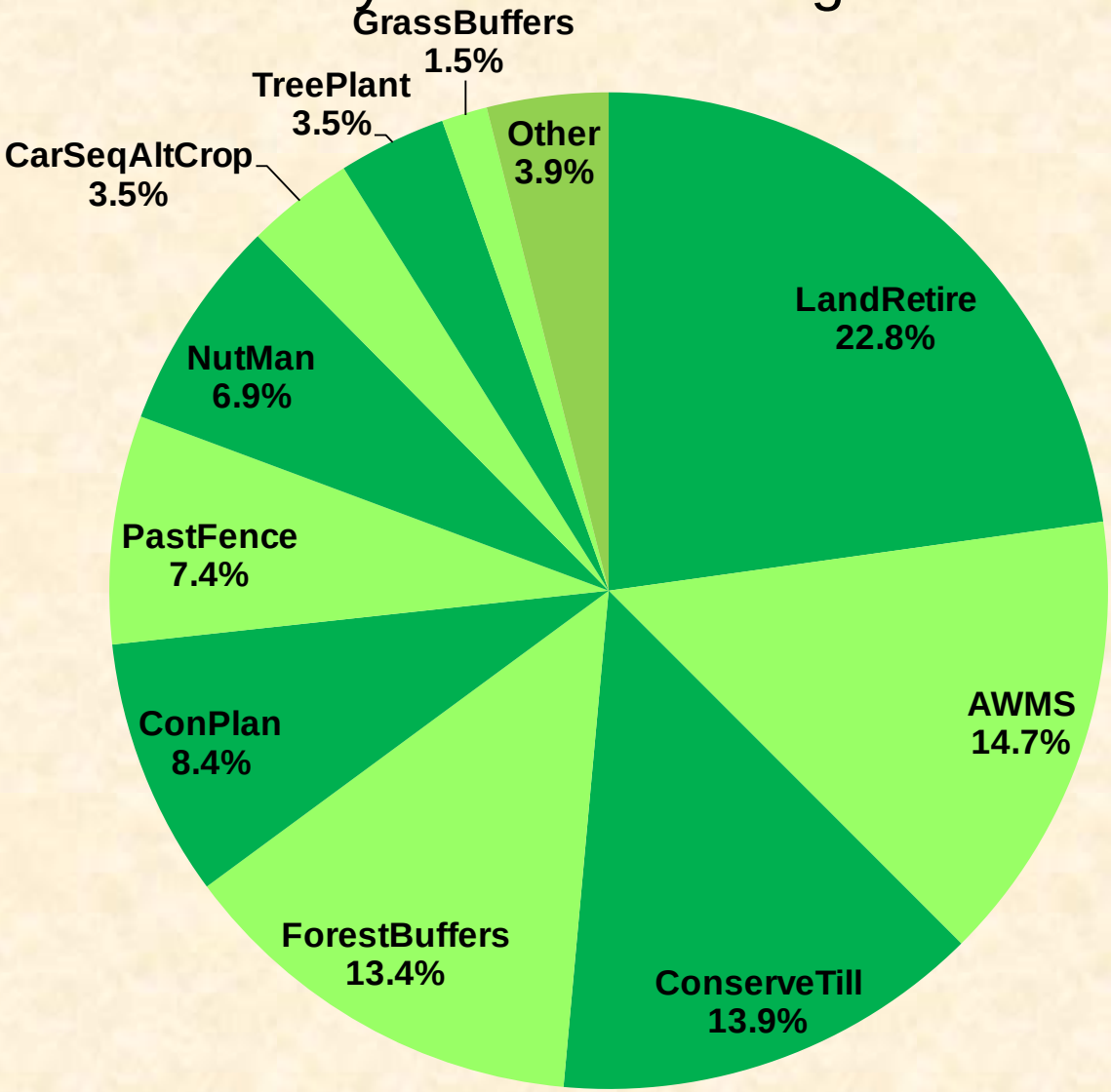
All Jurisdictions' – 2013 Progress

Each slice represents the percent of the total agricultural load reduction from No-Action to 2013 attributable to state-reported implementation levels for that BMP.



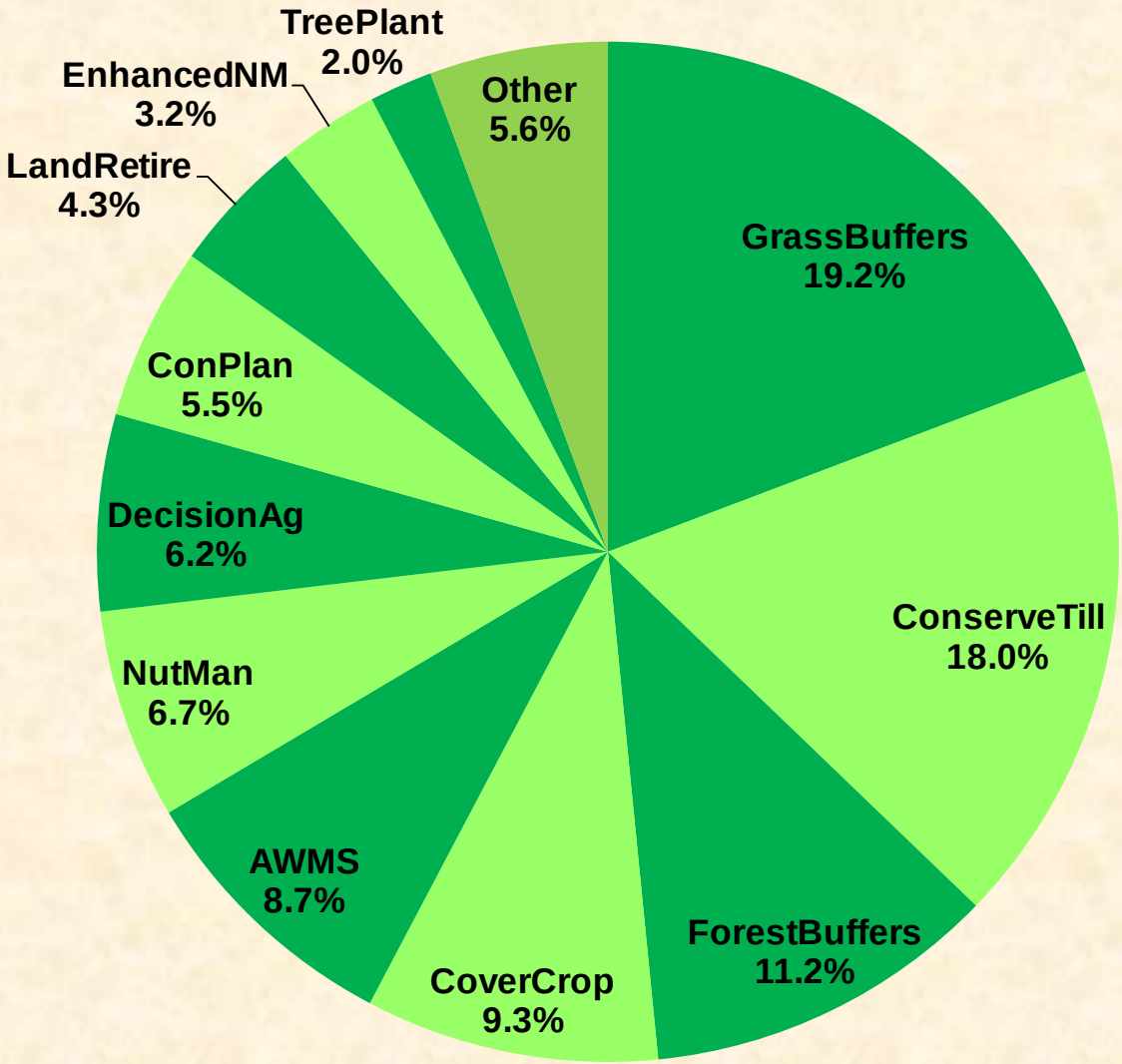
Agriculture Nitrogen Load Reduction by BMP

Pennsylvania 2013 Progress



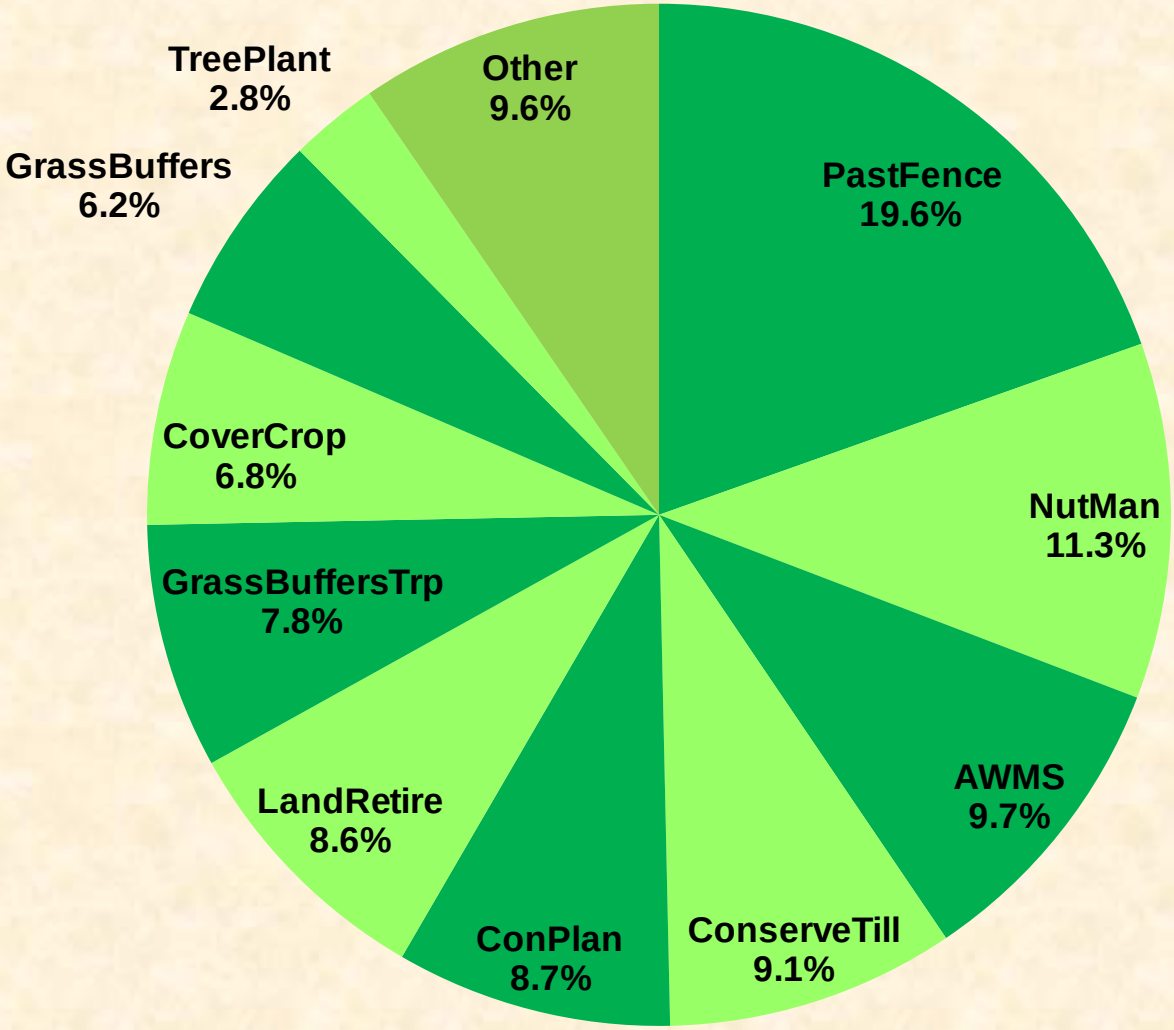
Agriculture Nitrogen Load Reduction by BMP

Maryland 2013 Progress



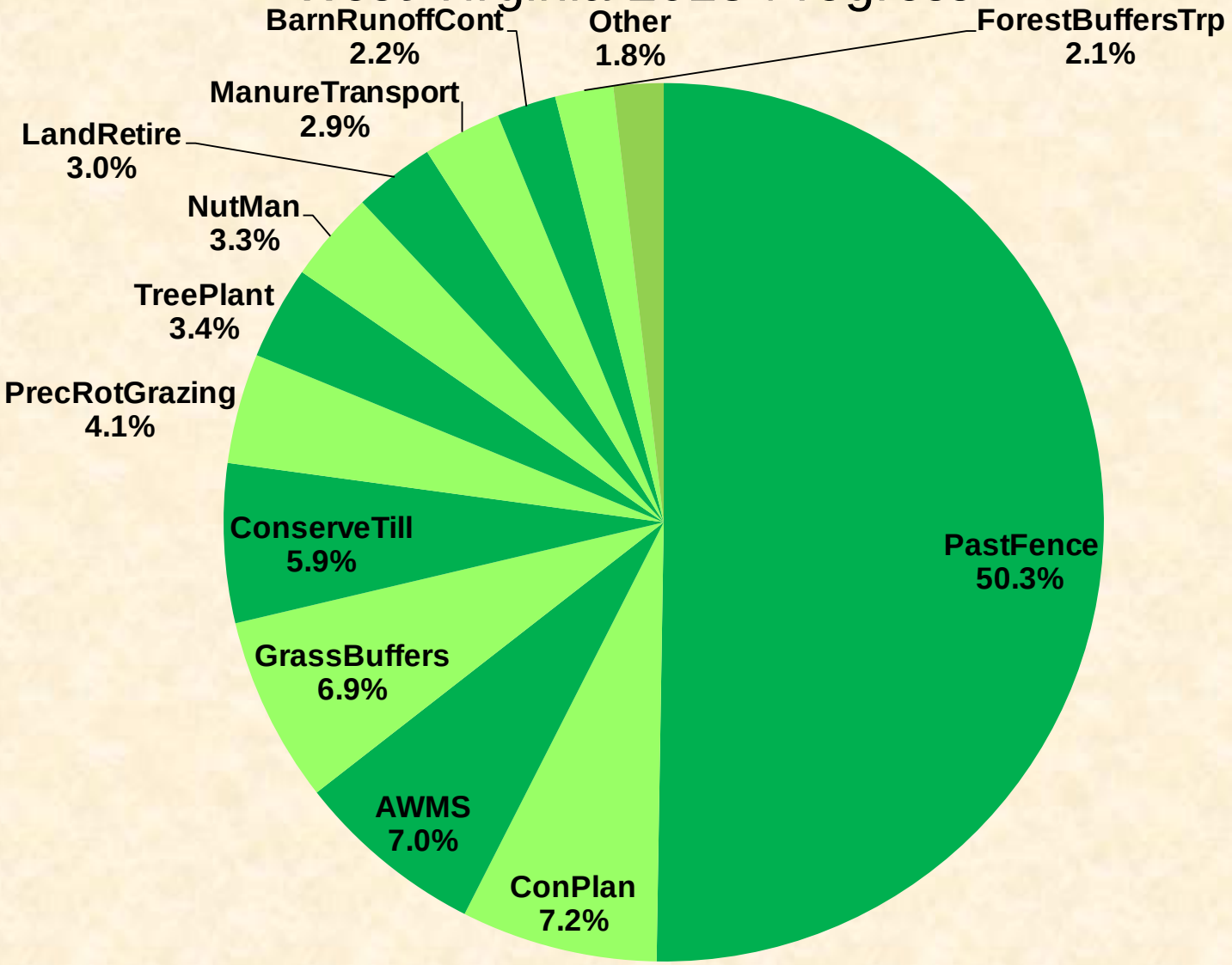
Agriculture Nitrogen Load Reduction by BMP

Virginia 2013 Progress



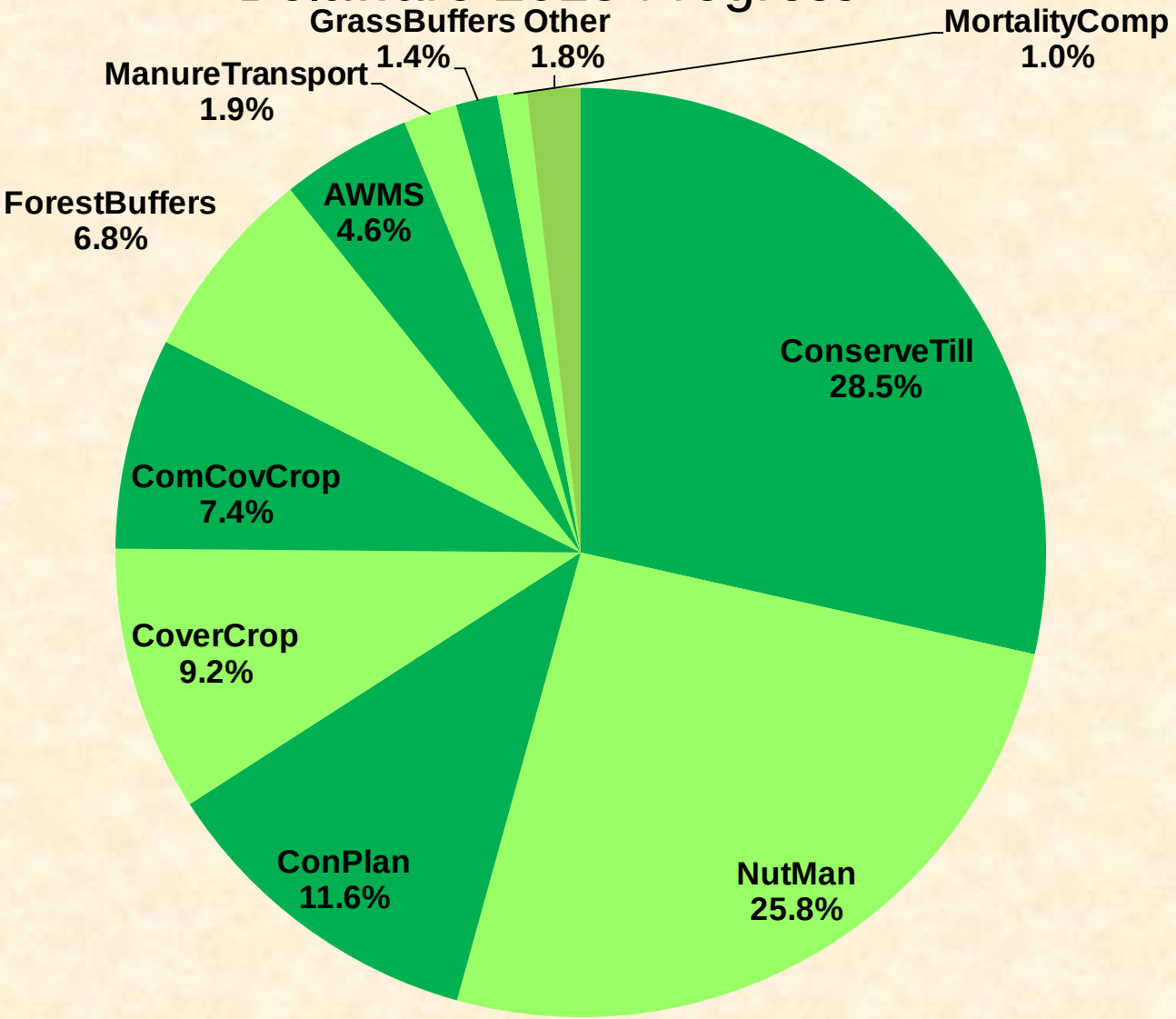
Agriculture Nitrogen Load Reduction by BMP

West Virginia 2013 Progress



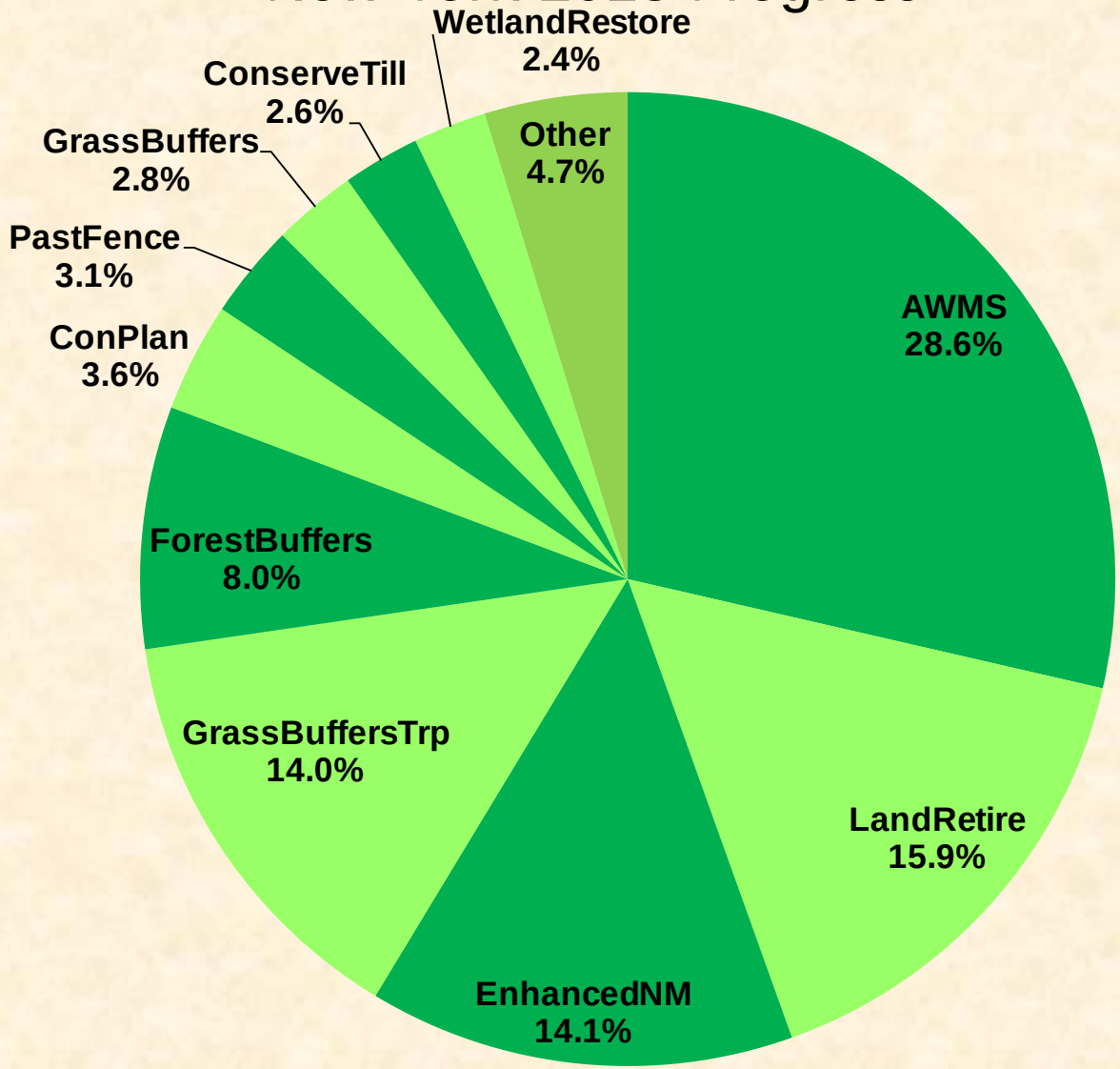
Agriculture Nitrogen Load Reduction by BMP

Delaware 2013 Progress



Agriculture Nitrogen Load Reduction by BMP

New York 2013 Progress

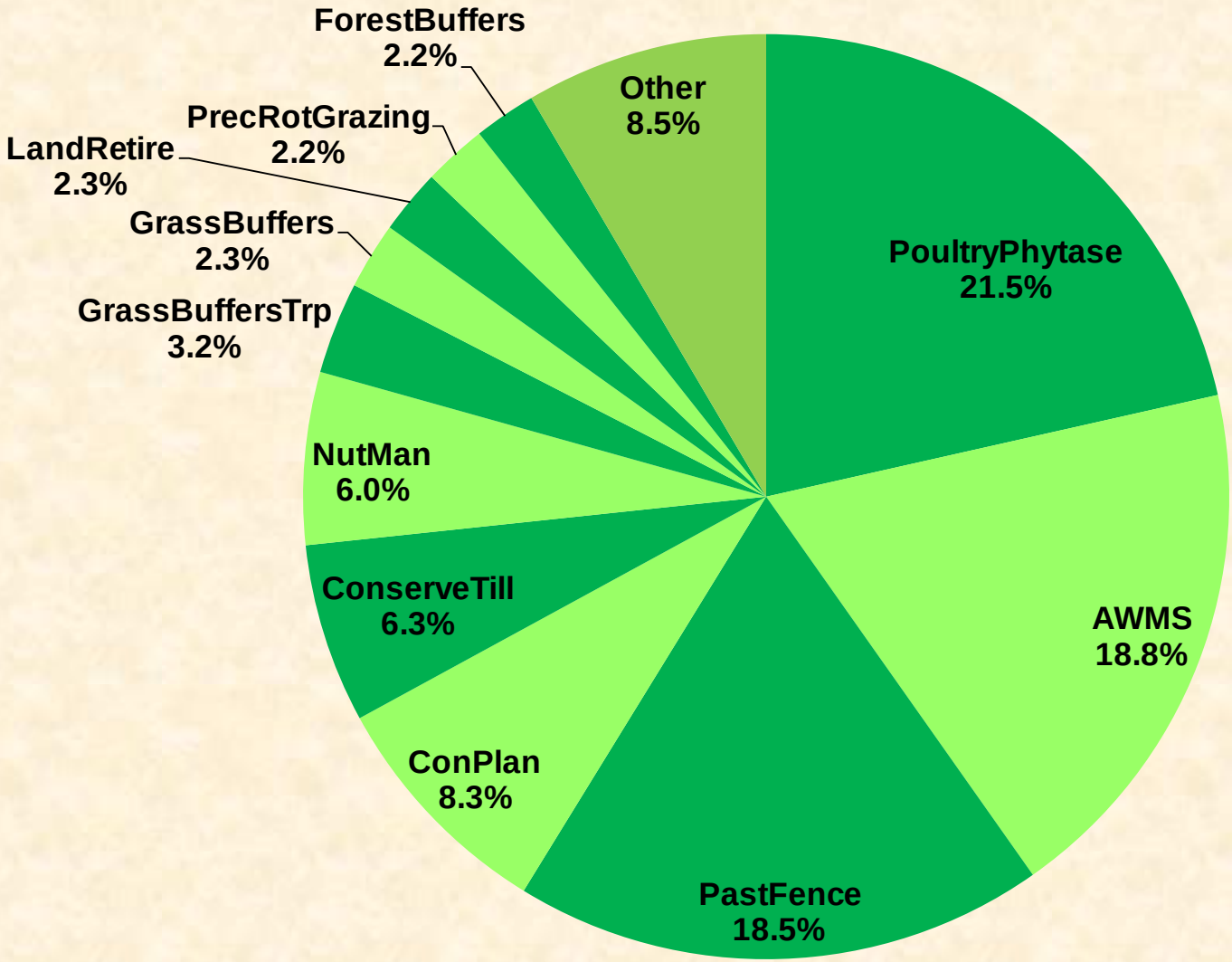


Agricultural Phosphorus Reductions

Relative influence of 2013 Progress BMPs on load reductions

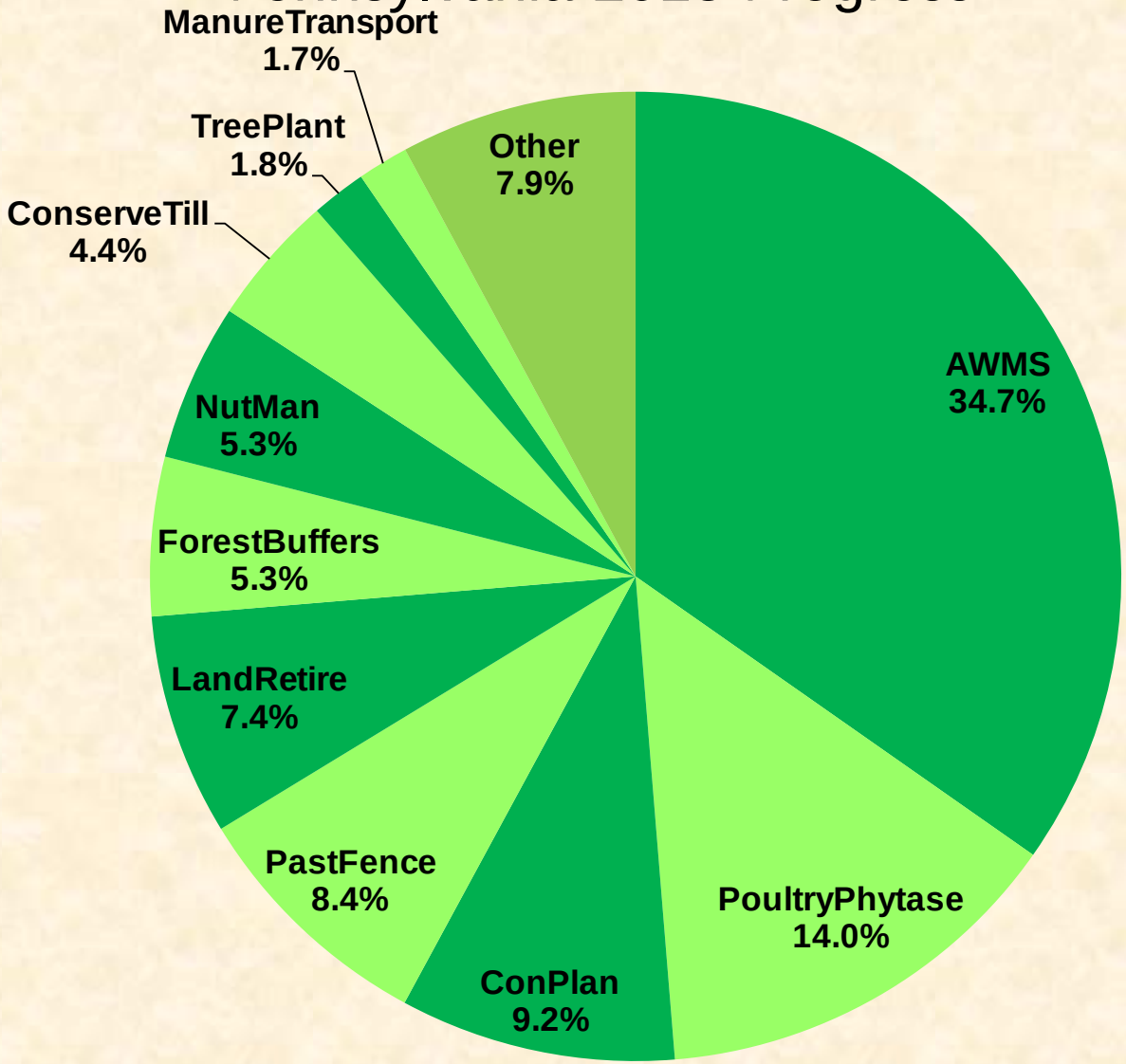
Agriculture Phosphorus Load Reduction by BMP

All Jurisdictions' – 2013 Progress



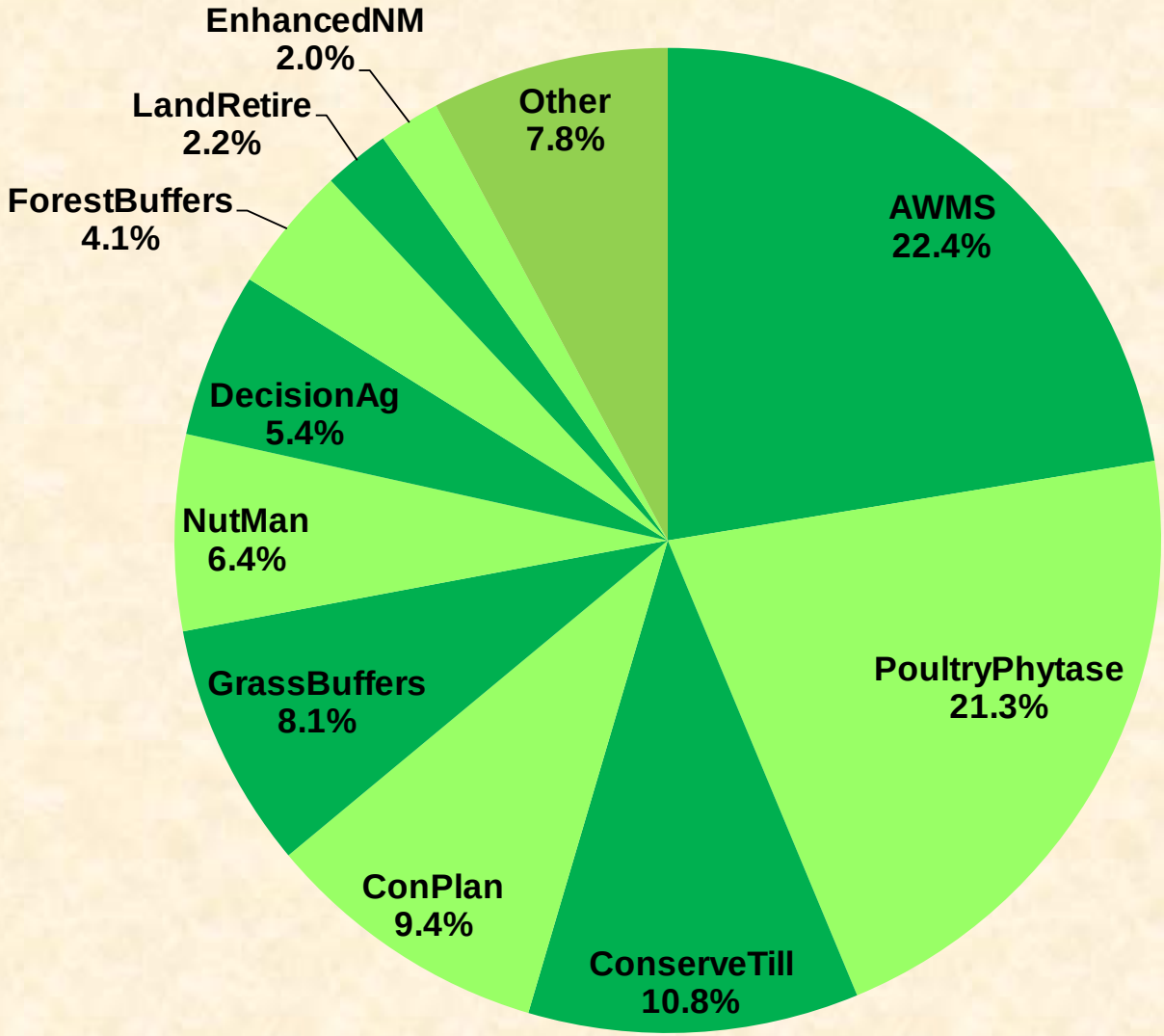
Phosphorus Relative Load Reductions

Pennsylvania 2013 Progress



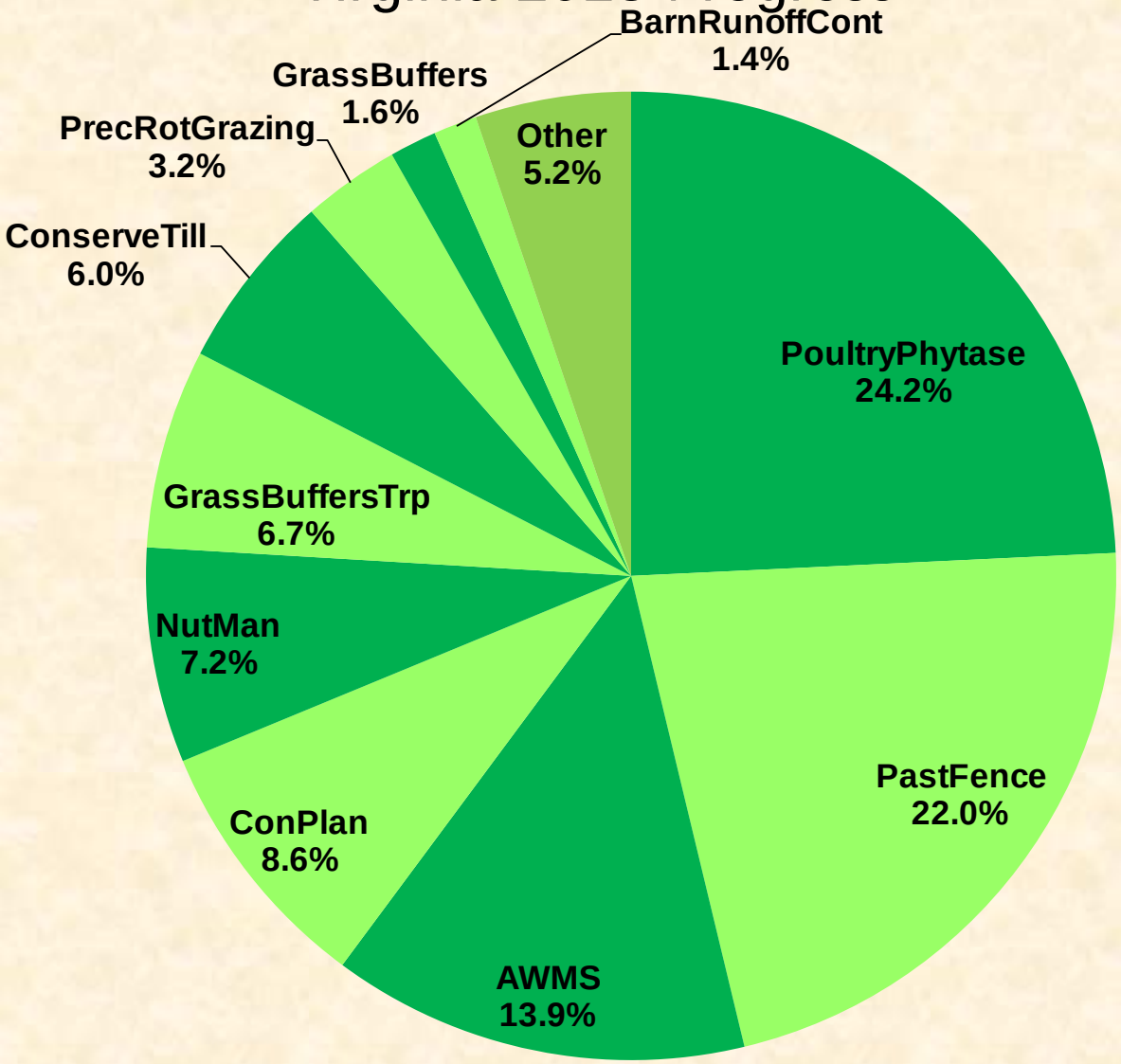
Agriculture Phosphorus Load Reduction by BMP

Maryland 2013 Progress



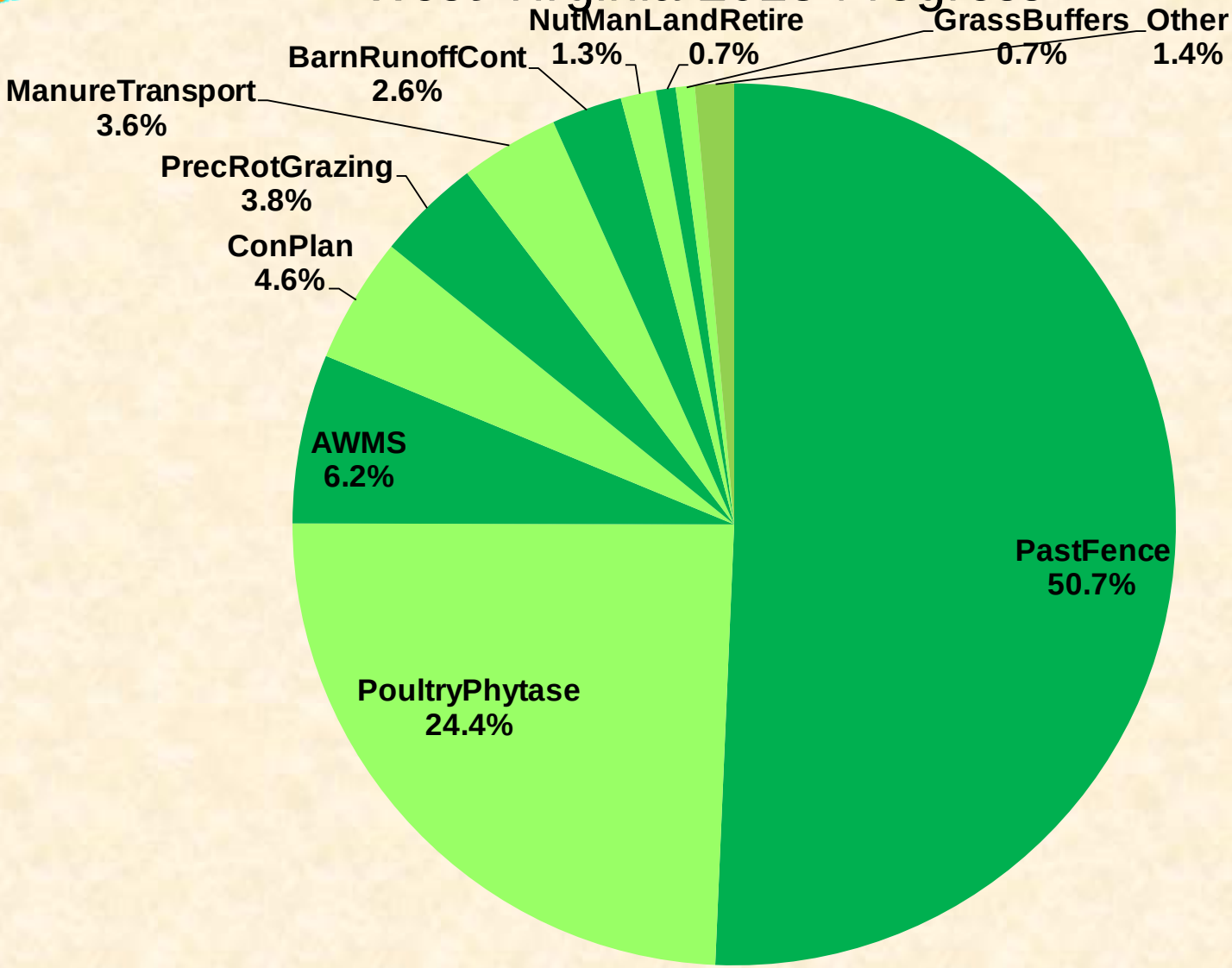
Agriculture Phosphorus Load Reduction by BMP

Virginia 2013 Progress



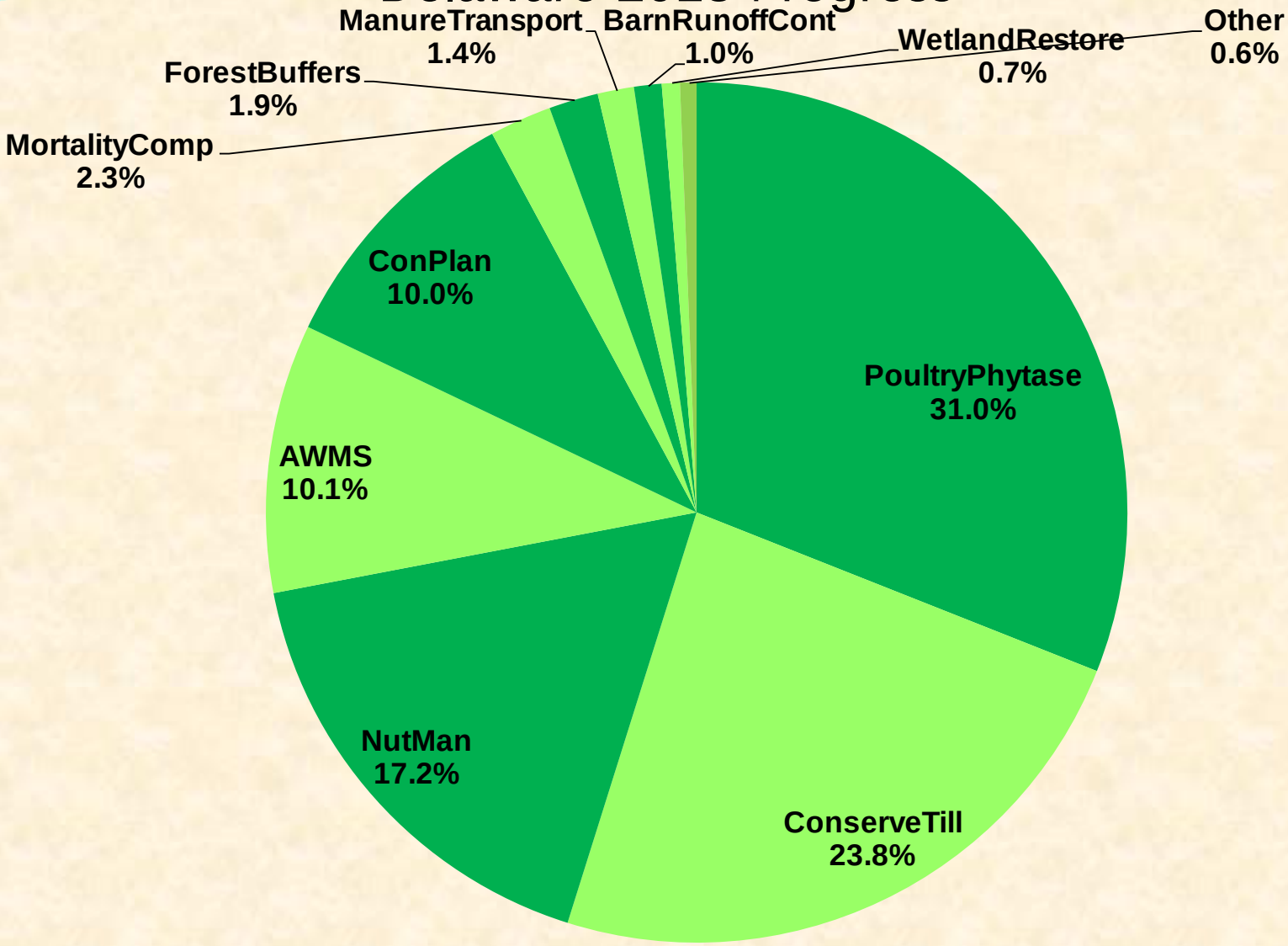
Agriculture Phosphorus Load Reduction by BMP

West Virginia 2013 Progress



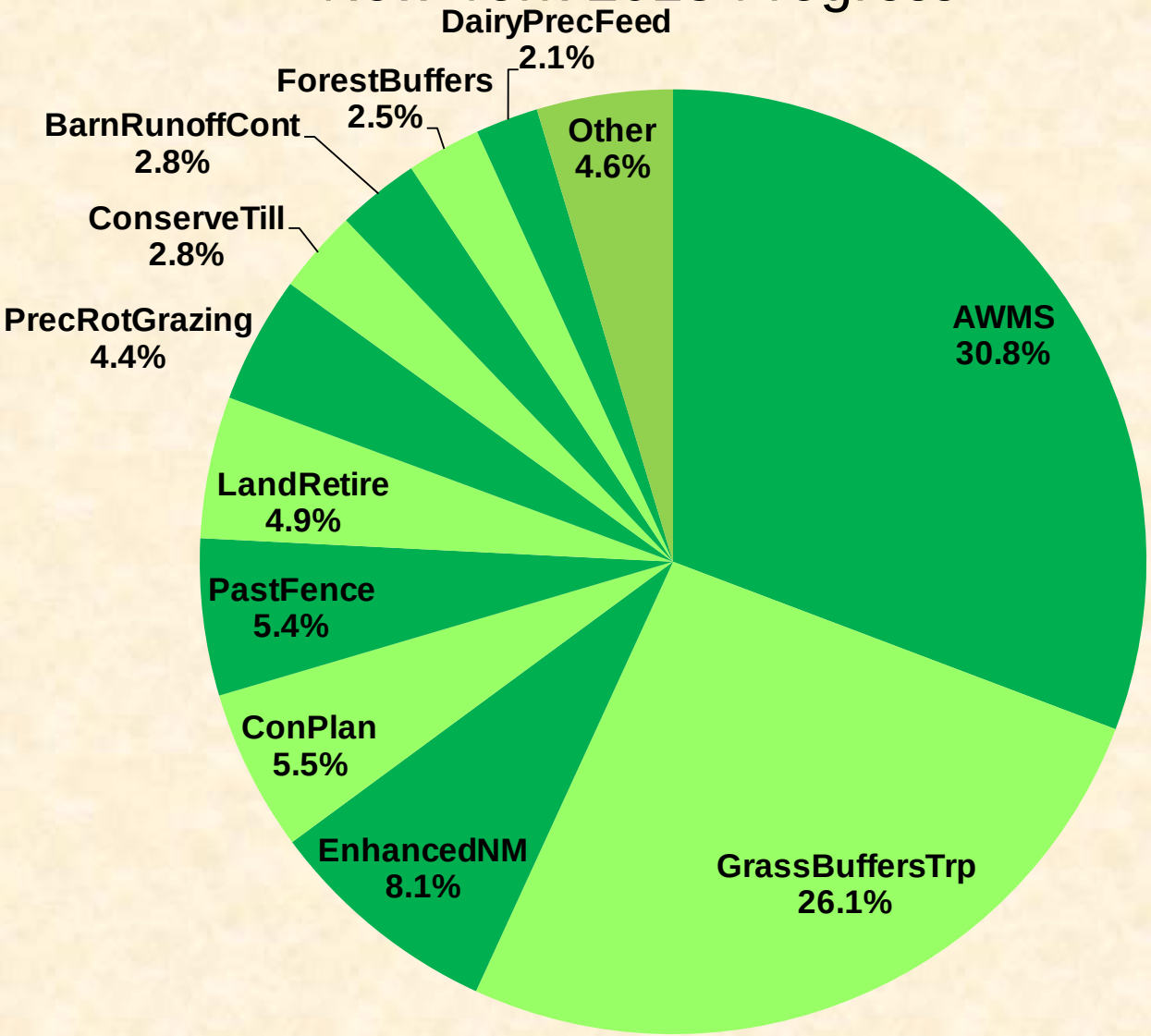
Agriculture Phosphorus Load Reduction by BMP

Delaware 2013 Progress



Agriculture Phosphorus Load Reduction by BMP

New York 2013 Progress

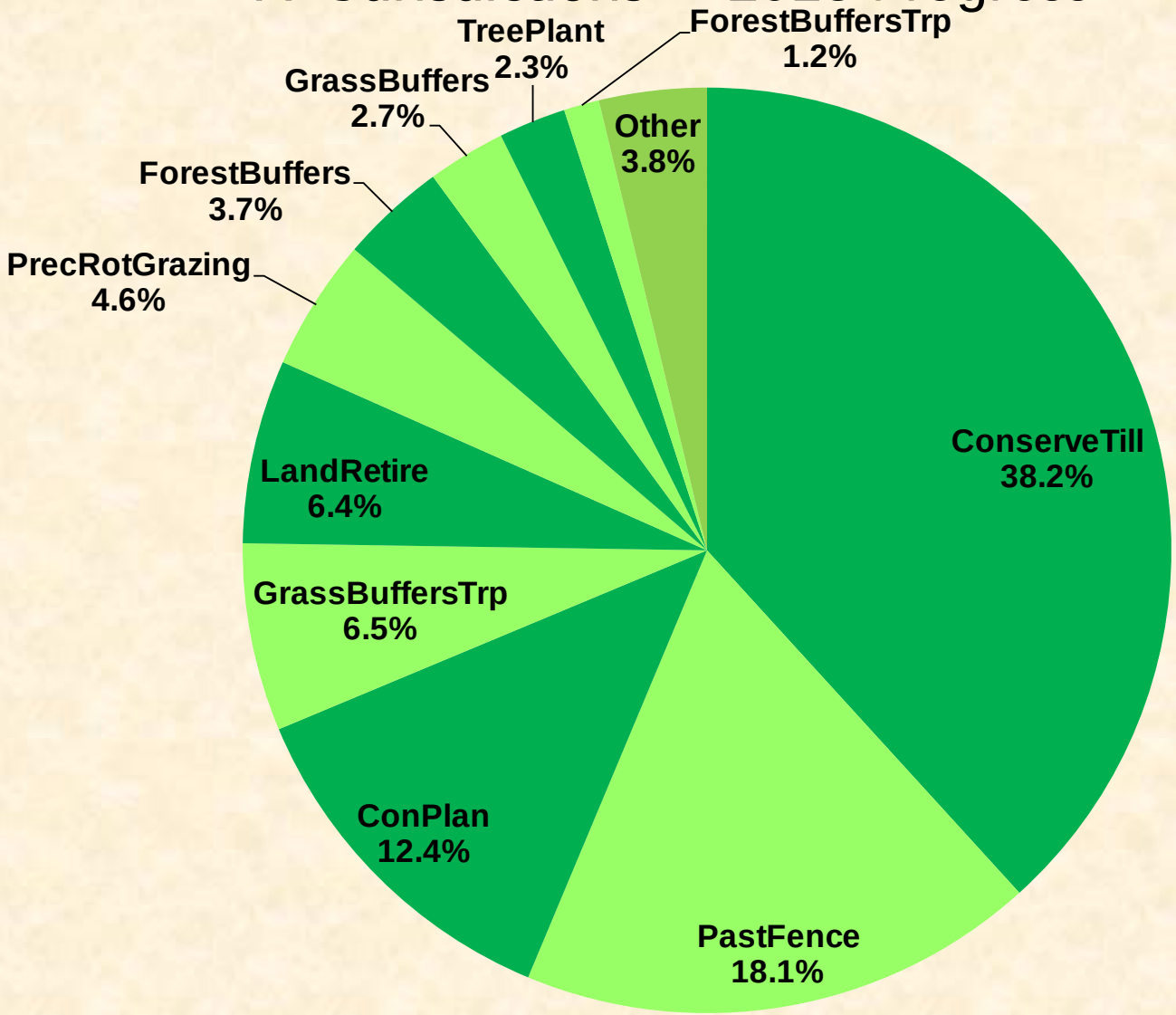


Agricultural Sediment (Total Suspended Solids) Reductions

Relative influence of 2013 Progress BMPs on load reductions

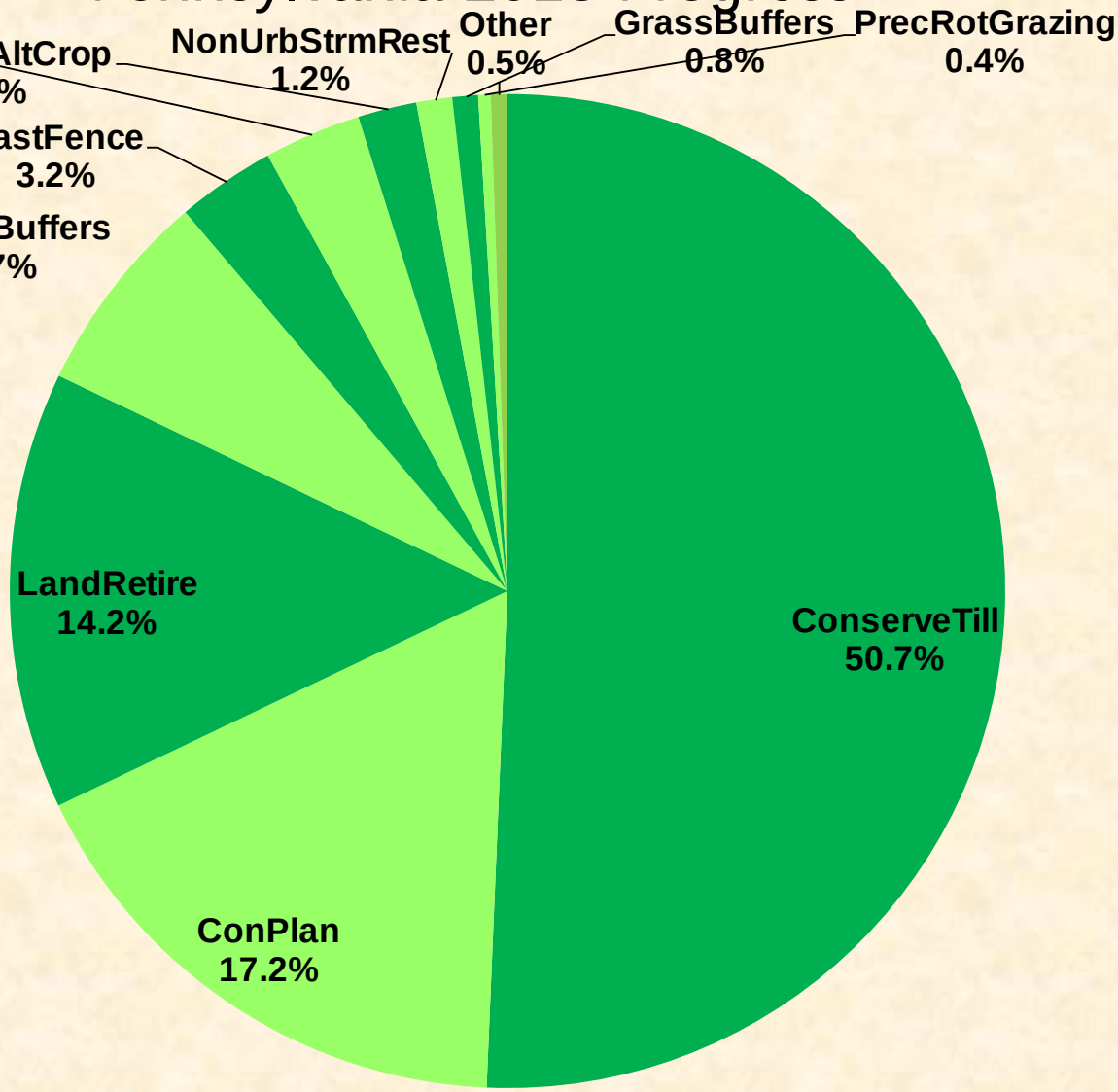
Agriculture Sediment Load Reduction by BMP

All Jurisdictions' – 2013 Progress



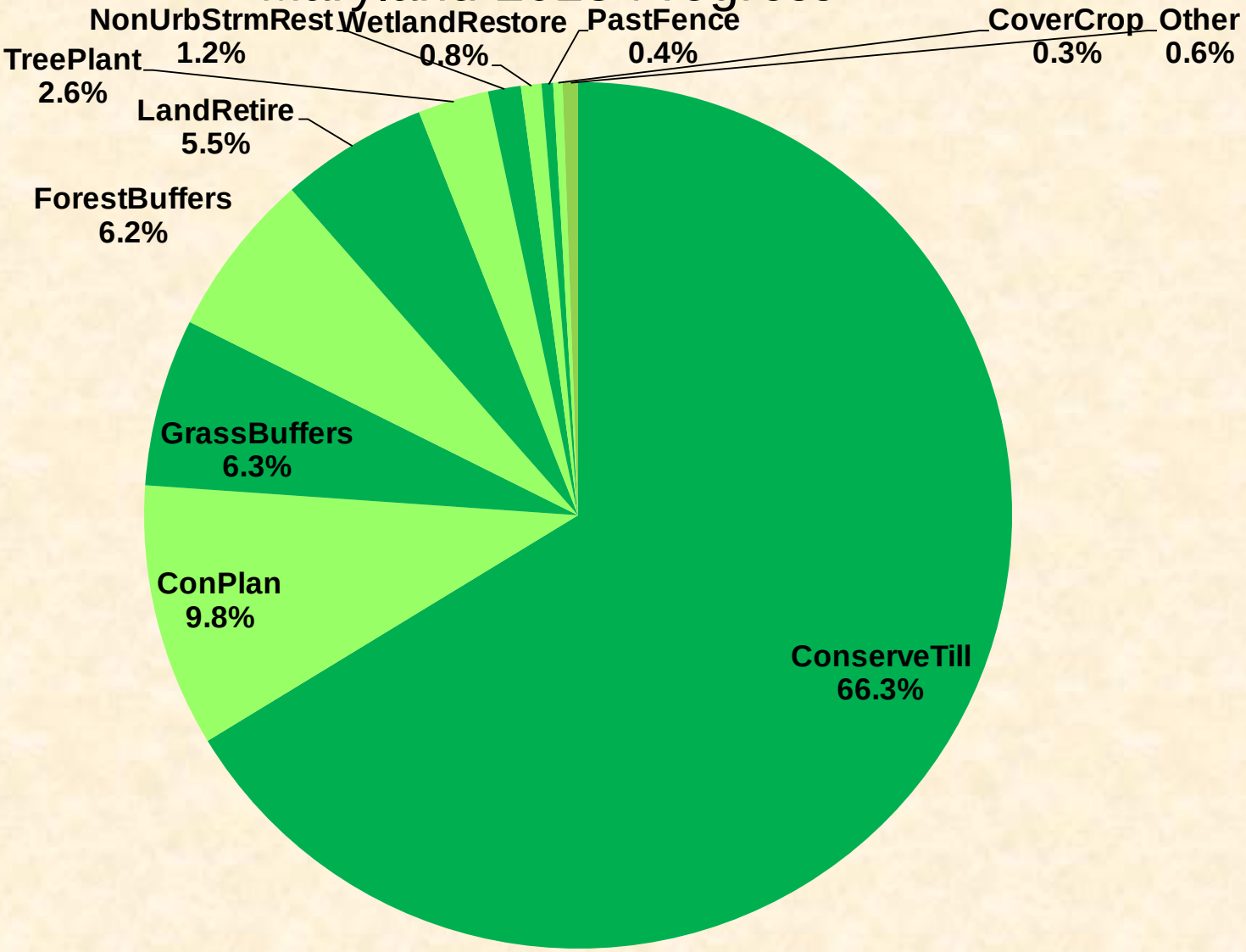
Agriculture Sediment Load Reduction by BMP

Pennsylvania 2013 Progress



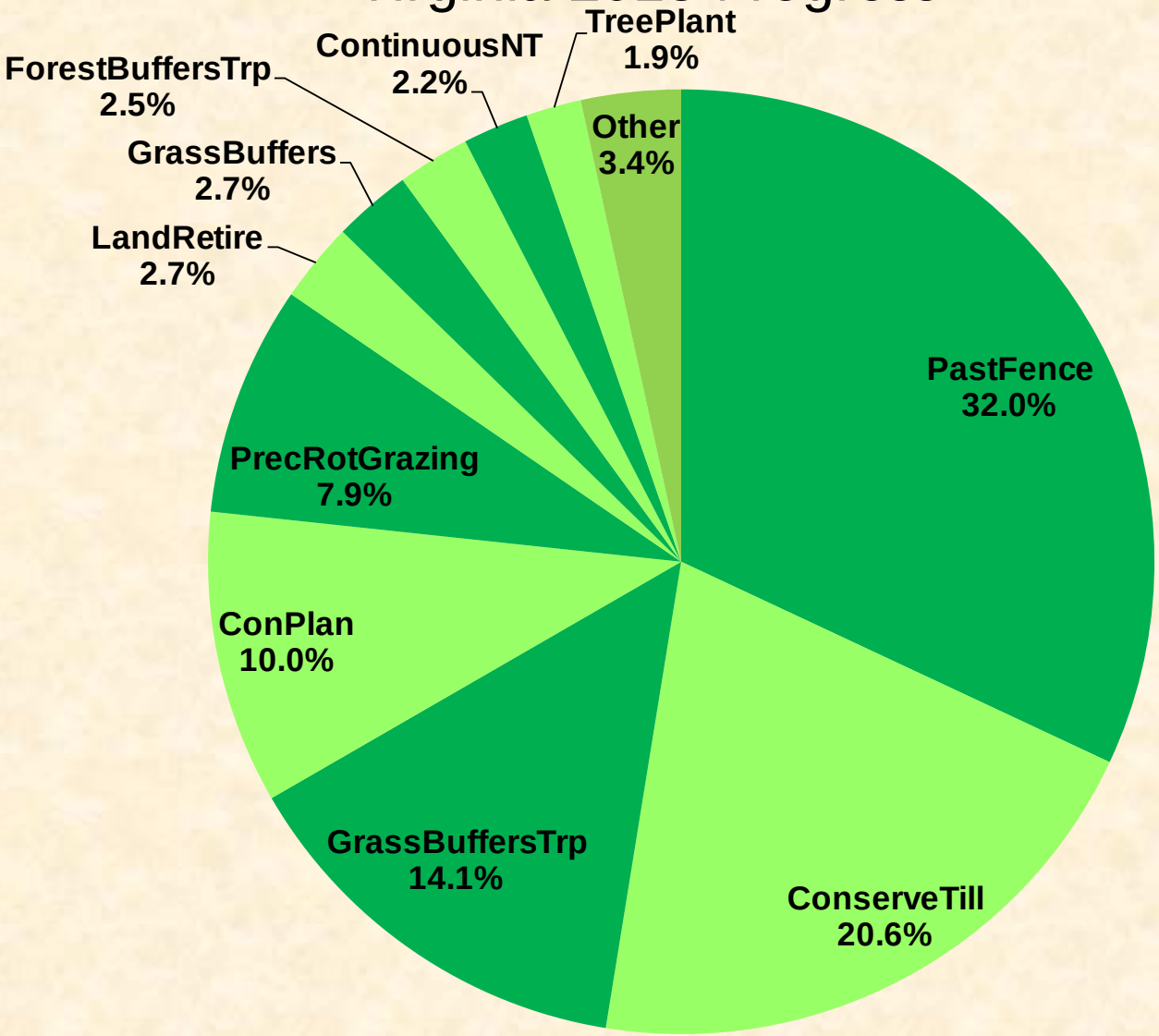
Agriculture Sediment Load Reduction by BMP

Maryland 2013 Progress



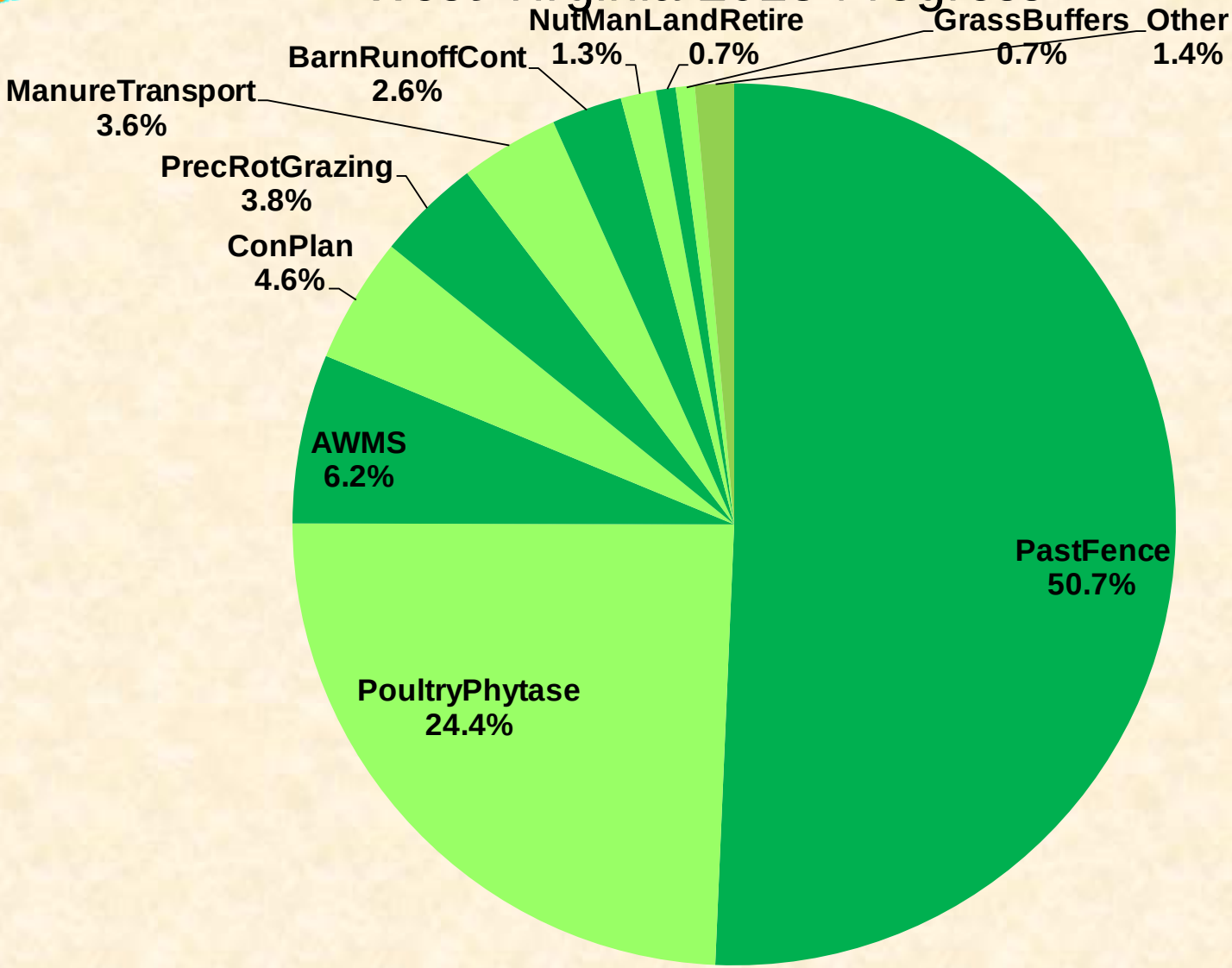
Agriculture Sediment Load Reduction by BMP

Virginia 2013 Progress



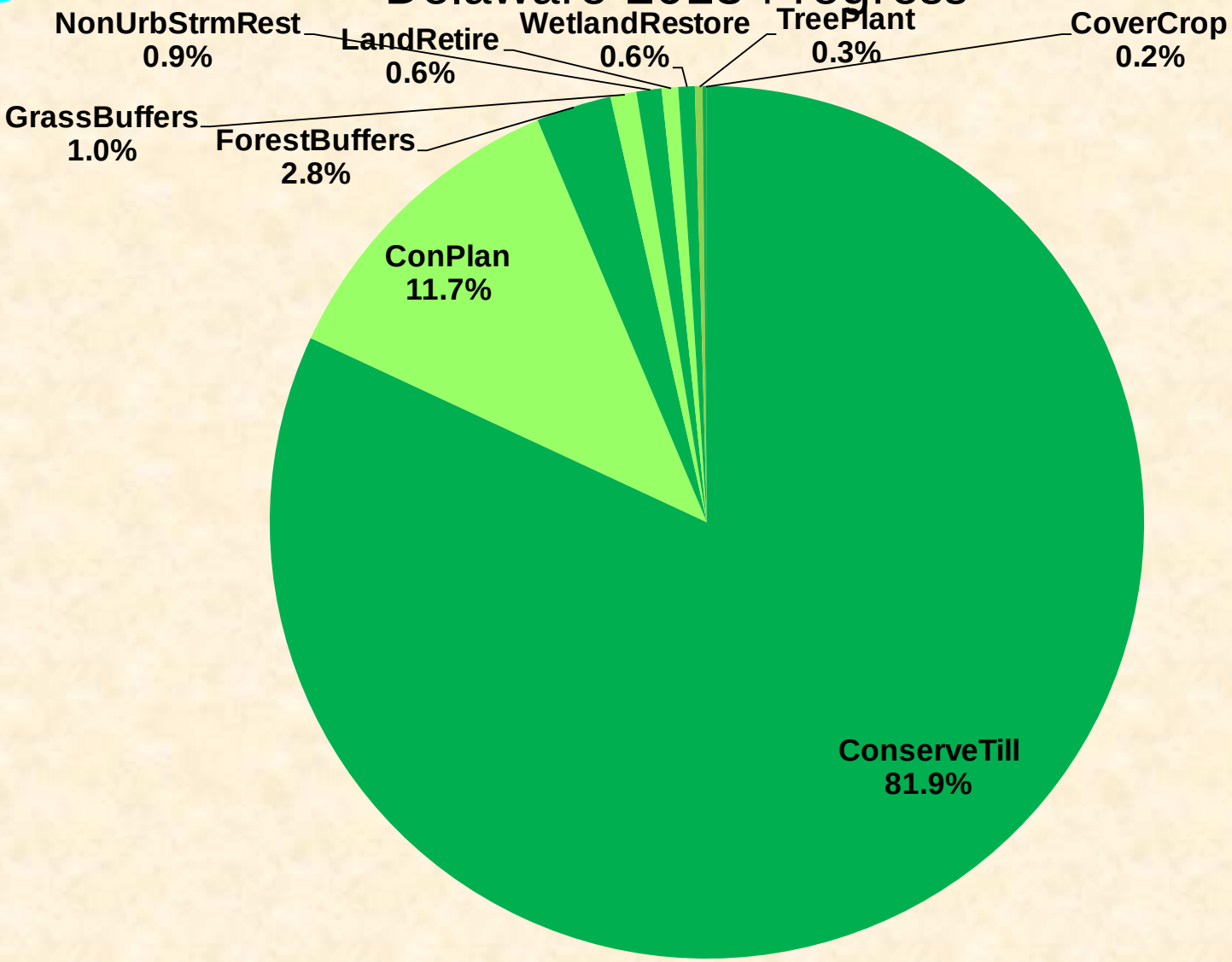
Agriculture Sediment Load Reduction by BMP

West Virginia 2013 Progress



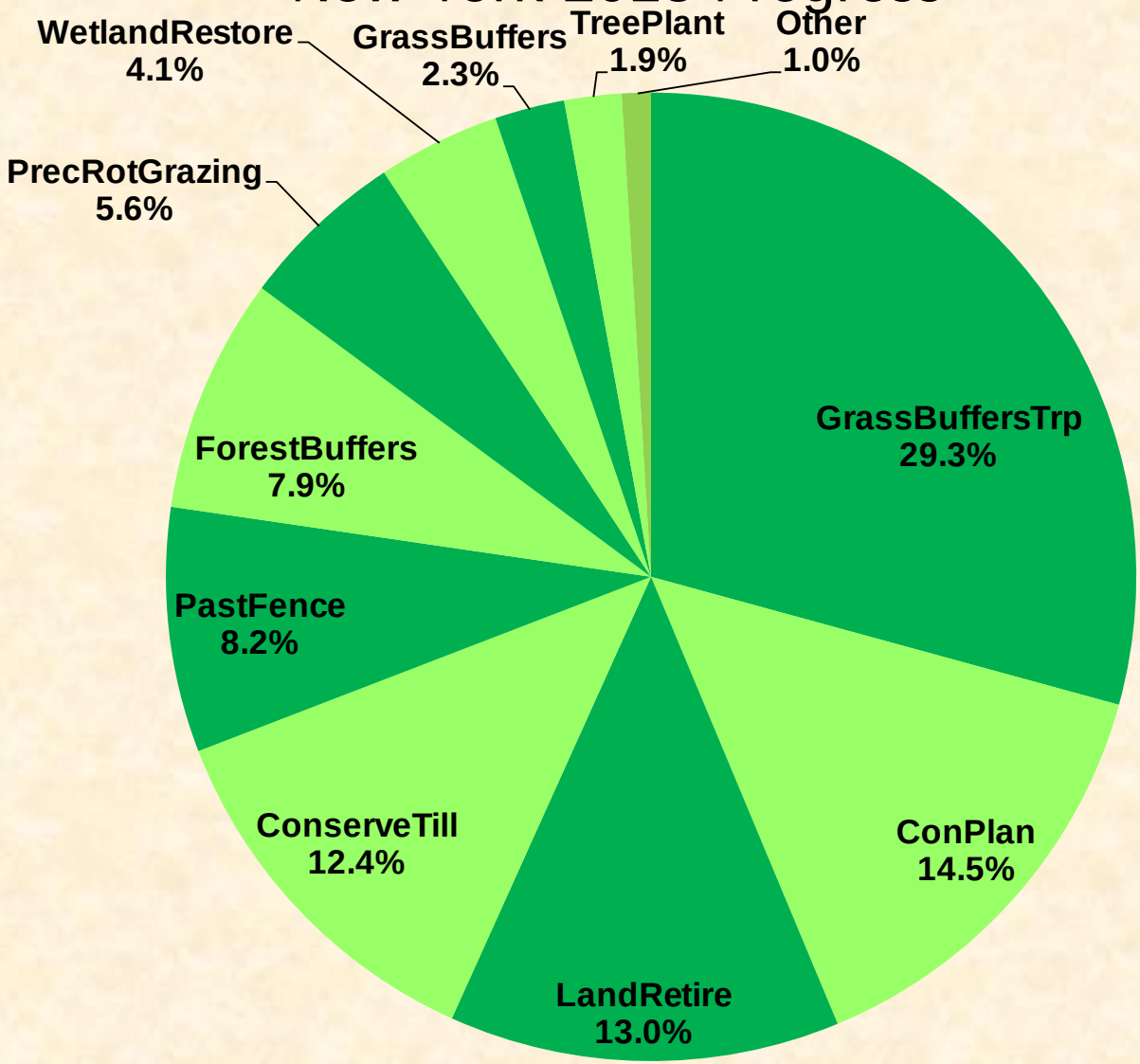
Agriculture Sediment Load Reduction by BMP

Delaware 2013 Progress



Agriculture Sediment Load Reduction by BMP

New York 2013 Progress



Forestry BMP verification guidance

This section describes guidance on how to verify the existence and performance of forestry BMPs in the Bay watershed. It has been revised to incorporate comments delivered by the Chesapeake Bay Program Partnership's BMP Verification Review Panel at their most recent meeting in April 2014. In addition, further comments submitted by June 30, 2014, from the CBP community are addressed. The organization is as follows:

I. Introduction

This guidance provides information on Forestry Best Management Practices (BMPs) and how best to verify that they have been correctly reported, installed, and maintained so they are deserving of the water quality benefits (nutrient and sediment load reductions) bestowed upon such Practices.

Forests cover the majority of the landscape in each Bay state. Protection of forested lands and restoration of trees in priority areas, such as riparian forest buffers (RFBs) along streams and shorelines, are vital for Bay watershed water quality and ecological health. The CBP Executive Council adopted an ambitious, science-based RFB goal in 2007 as part of the Forest Conservation Directive. Riparian forest buffers planted on agricultural land are one of the BMPs on which the states are most relying to achieve Bay water quality goals in their Phase II Watershed Implementation Plans. In addition to RFBs, other forestry BMPs play an increasingly important role, especially in the urban sector (see Section VI.).

Forests are not generally pollution sources. Instead, they absorb and use nutrients (greatly reducing nutrients from airborne sources, for example) and retain and use sediment, thus aiding pollution prevention. Four of the five Forestry BMPs covered by this guidance are types of tree planting designed to improve environmental and water quality conditions in currently non-forested areas, including tree planting in riparian areas. These tree planting practices apply to Agriculture and Urban landscapes. The Forest Harvesting BMPs are the only BMPs applied specifically to current Forest landscapes at this time.

Generally speaking, forest planting BMPs (riparian forest buffers and tree planting) are intended to last for a very long time. After verifying that buffer and tree planting projects have been installed and surviving according to plans, and after performing site inspection and maintenance

during the initial growth period or until considered established), forest BMPs will become easier to verify by aerial photography and inexpensive to maintain over the long term compared with other types of BMPs. Once the tree planting is established, the principal remaining concern is whether effectiveness of buffers will be undermined by concentrated flow or channelization circumventing the benefits of the buffer.

The five forestry BMPs for which verification guidance is presented are: a) agricultural riparian forest buffers; b) agricultural tree planting; c) expanded tree canopy; d) urban riparian forest buffers; and e) forest harvesting BMPs. Because of similarities in how the two agricultural BMPs are implemented, and how the urban forestry BMPs are implemented, they are grouped accordingly. This guidance is for use by the Chesapeake Bay states and, in general applies to federal installations as well, so they may use it to write Protocols for verification.

The Forestry Workgroup is mindful of the extensive resources needed to support BMP verification, and fully supports the "verification intensity" concept recommended by the CBP-VRP (2013). The intensity of verification efforts should be in direct proportion to contribution that a BMP makes to overall TMDL pollutant reduction in a state's Watershed Implementation Plan. The basic notion is to prioritize local and state verification resources on the BMPs that produce the greatest modeled load reduction in each state as reported in their annual progress runs to CBP. The converse also applies: less verification resources should be devoted to BMPs that make minor contributions to overall load reductions.

II. Role of the Forestry Workgroup in Verification

Since the late 1990s, the Forestry Workgroup has worked with Bay states to improve tracking and implementation of the oldest and most important BMP for water quality improvement: riparian forest buffers on agricultural lands. Bay watershed state forestry agencies are involved to varying degrees in inspecting newly-installed buffers and providing guidance and assistance for other forest restoration activities. When the Workgroup reviewed jurisdictions' tracking practices for all forestry BMPs in a December 2011 workshop, it saw a notable disparity in how and whether jurisdictions collected BMP implementation data. For example, regulation and oversight of forest harvesting vary considerably among states. Urban forestry BMPs (urban riparian buffers and expanded tree canopy) have only begun to be reported regularly by jurisdictions, despite having been defined Bay Program practices for over 10 years.

Seeing the disparities, the Forestry Workgroup was primed to work on BMP verification and more consistent BMP tracking in 2012. The Workgroup responded to the Water Quality Goal Implementation Team's request to develop guidance for verifying BMPs as part of the CBP's overall initiative to improve accountability of restoration practices. Multiple versions of the guidance were reviewed and discussed during Workgroup meetings in 2012 and 2013. The Expert Panels for Riparian Forest Buffers and Urban Tree Canopy provided input. In addition to BMP verification, the Forestry Workgroup tackled an even more difficult accounting issue: the extent to which agricultural riparian buffer planting has resulted in a net gain of forest buffers watershed-wide, given the loss of riparian forest to development and, in some areas, to crops. The Workgroup also looked at tools for assessing the net effect of urban tree planting.

The process was aided by interactions with the Agriculture and Stormwater Workgroups, who are keenly interested in forestry practices taking place on agricultural and urban lands. These Workgroups have agreed that the Forestry Workgroup should develop technical verification definitions and guidance for forestry practices which supplement the general verification guidance they produce. In particular, the Forestry Workgroup guidance goes beyond that guidance to focus on net gain in riparian forest buffers and tree cover.

III. Background on Forestry BMPs Implemented on Agricultural Lands

Agricultural riparian forest buffers and tree planting are most often implemented in the Chesapeake Bay watershed through the USDA and state agricultural cost-sharing programs. In fact, a single project may be funded by multiple agencies. Cost-shared project design and implementation are guided by technical standards, and there are verification programs already being implemented by the funding agencies. In some states, state forestry departments provide additional monitoring for agriculture cost-share projects involving tree planting.

Riparian forest buffers and tree planting may also be carried out voluntarily by a farmer at his own expense. To date, such projects are a small fraction of the total projects credited in the Chesapeake Bay Program, but there is a current initiative under the 2010 Chesapeake Executive Order Strategy to develop a program for recognizing and giving credit to voluntary agricultural BMPs, including forestry BMPs. The voluntary riparian buffer plantings reported to date have generally been orchestrated by large non-governmental organizations that regularly do this type of work with volunteers.

Riparian Forest Buffer Description: Agricultural riparian forest buffers are linear wooded areas along rivers, streams, and shorelines with at least 2 types of woody vegetation. Forest buffers help filter nutrients, sediments and other pollutants from runoff as well as groundwater. The recommended buffer width for agricultural riparian forest buffers is 100 feet, with acceptable widths from 35-300 feet.

Tree Planting BMP Description: Agricultural tree planting includes any tree planting on agricultural land, except those used to establish riparian buffers. Lands that are highly erodible or identified as critical resource areas are good targets for tree planting.

Current Procedures:
The vast majority of forest practices on agriculture land are cost-shared conservation practices on agricultural land that are long-term in nature (once established, the practice often continues in perpetuity needing relatively little maintenance), and originate with a Conservation Reserve Enhancement Program (CREP) or Environmental Quality Improvement Practice (EQIP) contract. Procedures for approving contracted practices are established by USDA. Often, more than one agency has oversight of these agricultural tree planting practices, including the federal USDA's Farm Services Agency (FSA) and Natural Resources Conservation Service (NRCS), state forestry, Conservation Districts, etc. For simplicity, and because roles vary from state-to-state, all those providing oversight of tree planting activities are referred to as CREP partners. For instance, FSA will keep contracts for CREP, a forestry agency will write a planting plan and

check for compliance, and a technical service providing agency may make multiple site visits and have landowner contact. Sometimes multiple databases track the same practice.

Until now, agricultural tree planting has not been a commonly-reported practice to the Bay Program. However, there are new and expanding opportunities through agroforestry to plant trees on agricultural land. Agroforestry is the intentional mixing of trees and shrubs into crop and animal production systems for environmental, economic, and social benefits, and includes practices such as windbreaks, silvopasture, and alley cropping.

Procedures on how to establish a riparian forest successfully are well-documented (for example, MD DNR 2005). It starts with a planting plan designed by a forester. Aspects of a good plan include: species selection, site preparation, and spacing of trees, among other factors. Forest buffer plantings almost always use tree shelters (e.g. 98% of the time in VA) to protect against herbivory. Shelters increase survival from 12% (no shelter) to 74% (with 4-foot shelter). Herbicide treatment is also highly recommended. Some of the trees planted are expected to perish but most must survive or be replanted to comply with contractual specifications. Repeated visits are made during establishment.

After establishment, a buffer planting may need additional maintenance to be fully functional. Adverse impacts include excessive traffic, livestock or wildlife damage, fire, pest or invasive plant infestations, and concentrated or channelized flows. The NRCS standard for this practice (Code 391) says the buffer will be inspected periodically and protected from these impacts. Maintenance is the responsibility of the landowner, and a portion of the public funding provided to the landowner is designated for maintenance expenses.

Below is the current protocol for verifying contractual agreements in CREP:

A. Verify Planting Establishment
    i. In practice, NRCS or another technical assistance partner (e.g., CREP partner) confirms proper establishment on every site at the 1 or 2-year point, and every year thereafter until the planting is determined to be established. “Established” means that the buffer meets the NRCS forest buffer practice standards and any additional state requirements (required stocking/survival rates vary by state).
    ii. If the site visit determines that the practice has not yet been established, replanting is usually required to get the buffer up to standard, and further site visits may be needed until the replanting is established. If the buffer never becomes established, it is taken out of contract.
    iii. Some states include detailed monitoring of plantings as well. Virginia CREP partners - VA Department of Forestry is the primary forestry technical expert - visit every planting site 3 times and have routine documentation about species planted, survival rate, and other issues.
B. Spot Check Plantings
    i. After the practice has been reported as established, USDA has a standard program of compliance checks on a portion of all contracts; the

requirement is for a minimum of 5% of the buffer contracts to be spot-checked each year.

ii. State agriculture conservation programs that provide a portion of CREP cost-share may have additional verification requirements, for example, VA DCR also requires spot checks on 5% of practices under contract each year throughout their lifespan.

C. Tracking

Currently, USDA data are used by most states to report accomplishments to the CBP model. These data include acres of practice, but do not currently include width of practice. Because of the CBP agreements and directives emphasizing the need for riparian forest buffer restoration, and to assure consistent, good reporting by jurisdictions, a second complimentary process was developed by the Forestry Workgroup. Since 1997, the Workgroup has been tracking buffers installed on agricultural lands. Each fall, the Workgroup requests geo-spatial data from the Bay states. The following 10 fields are requested from the state contacts and every year CBP maps the point data for analysis:

Field 1: Unique identifier (parcel ID, etc.)
Field 2: State
Field 3: Latitude
Field 4: Longitude
Field 5: Miles of forest buffer
Field 6: Width of forest buffer
Field 7: Planting date
Field 8: Ownership type (public/private: Federal, state, other public, private)
Field 9: Notes/Comments field
Field 10: Watershed name or HUC

The Forestry Workgroup's specialized tracking has been a means of cross-checking what is reported to the National Environmental Information Exchange Network (NEIEN)/Chesapeake Bay (CB) model--- it helps prevent double-counting and it establishes an average width of practice. As improvements are made to riparian forest buffer information coming through the USDA agreement with EPA and USGS, and confidence in the information improves, the Forestry Workgroup will evaluate whether to continue its complementary tracking procedures.

IV. Verification Guidance for Agricultural Riparian Buffers

1. *Verification methods for cost-shared agricultural riparian forest buffers will utilize and build upon the verification programs already implemented for cost-share contracts.*

- Continue following the current protocol for verifying contractual agreements in CREP and verifying the buffer has been installed according to plan. In the plan, it is suggested to note likely site impacts that need to be addressed with maintenance. After installation, a buffer site should be visited at least twice during the time it is becoming established to assure the buffer will meet practice standards and any problems are corrected. The minority of buffers that are cost-shared using other programs (e.g., EQIP) should follow the same protocol used for CREP buffers.

- A buffer can be credited when its installation according to plan is confirmed. When reporting the buffer for CBP credit, the reporting agency should capture width of the buffer in the NEIEN in addition to acres of practice.

2. Inspection and maintenance are critical: a) to insure riparian forest buffers become established effectively; and b) to verify that the buffer is being maintained throughout the contract and channelization is not occurring.

- After establishment is verified per contractual procedures, proceed with periodic inspections (spot checks) to see how well maintenance issues are being addressed by the landowner. Currently, a minimum of 5% of contracted practices are spot-checked. But additional spot checks are needed to ensure that impacts do not threaten the performance of the buffer.

- States should be 80% confident that water quality impacts are being avoided in the most likely places. Statistical sampling is recommended as a targeted and cost-effective means to have confidence that maintenance is happening effectively. Sampling design should focus on common and specific maintenance issues that have the most potential to impact water quality, such as channelization/concentrated flows. For instance, to protect from concentrated flows, a stratified sampling design could look at all buffer sites that are on slopes of 7% or greater –i.e., where the impact is most likely to occur.

- States should describe in detail how they plan to conduct follow-up checks that go beyond the 5% spot-checking that is the current practice.

- Plantings to be spot-checked for maintenance should be between 5 and 10 years old because this is the period between establishment and re-enrollment when the least number of inspections occur. Most maintenance issues are easily detected, and state protocols should describe typical maintenance violations that need to be checked. If statistical sampling design help is not available, states can recommend other means of spot-checking to reach an 80% confidence level.

3. Special attention is needed at the end of contract life (10 or 15 years), to determine if a new contract will ensure continuation of the buffer or if the buffer will be maintained voluntarily without a contract. In lieu of confirmation that the buffer will still be on the landscape, it will need to be removed from NEIEN after the contract expires.

- This action is recommended to encourage the conservation of existing buffers. CREP contracts expire after 10 or 15 years, and a record amount of sign-ups in 2001-2007 are due to expire in the next few years. There are three likely scenarios when a contract is ending: 1) the landowner re-enrolls the buffer into another 10 or 15-year contract; 2) the landowner does not re-enroll, but plans to keep the buffer; or 3) the landowner does not re-enroll and plans to get rid of the buffer. Actions taken now by CREP partners can lead to more landowners being in the re-enrollment category (#1), and to knowing what to expect for those lands coming out of contract (#2 or #3). To re-enroll, CREP partners must determine that the buffer still meets the practice standards (survival/stocking rate).

To facilitate the re-enrollment process (and thus retain functioning buffers), the following actions are recommended:

a. CREP partners conduct outreach/technical assistance to landowners with expiring contracts.
b. CREP partners field check buffer sites in the last 2-3 years of contract to assess whether buffers meet standards and will be continuing after contract expiration, either through re-enrollment in CREP or voluntary retention of buffer.
c. Acres of buffer that do not meet the practice standard or will not be retained should be removed from NEIEN/CB model. FSA will assign a unique identifier to each project in the future so it can be tracked better and doesn't become double-counted when re-enrollment occurs.

4. Implementation strategies should include approaches to conserve existing forest buffers so that newly planted buffers represent a net gain in overall buffers for a county or watershed segment. The following examples support this point:

a) Laws or ordinances that encourage conservation of existing buffers are in place.
b) Monitoring and maintenance occurs on both newly planted buffers and also on existing buffers.
c) Periodic sampling of total buffer area to indicate that overall riparian buffer canopy in the county or watershed segment is increasing (Part 3 below).

- CREP partners should establish a baseline for total riparian forest buffer acreage in a given county using high resolution aerial imagery to be able to determine whether there has been a loss in riparian forest cover. A number of software tools and geospatial programs are available to help with this. For example, every 5 years, the reporting agency will sample the three counties in each state that have experienced the most development or increase in agriculture (per agriculture census) to show there has not been a loss in total buffer cover—this is not information that is "entered" in the model, but a way of assuring that what is reported is a net gain. If a loss in overall riparian forest buffer coverage in these counties is detected, it would result in county-wide removal of buffers reported as a "net gain" for those years. The theory is that if a state can show that it is maintaining buffers in the counties with the most threat, then it is assumed that buffers are being protected in less critical counties.

5. *Where agricultural riparian forest buffers are being planted voluntarily and reported by farmers or non-governmental organizations, jurisdictions may give them credit for an initial four years without inspection, only if such plantings represent a small portion of the total acreage of buffer plantings reported in a given year.*

- To credit riparian forest buffers installed voluntarily by a landowner or non-governmental organization, the reporting agency must obtain information (e.g., description of the project plan and photographs) to verify that the buffer has been installed, and has the characteristics of an effective buffer (at least two tree species and a minimum width of 35 feet). In addition, credit requires the same tracking information as described for cost-shared practices.

- When voluntary riparian forest buffers account for 5% or less of a state's reported buffer acreage, initial verification does not require a site-inspection. Practices that are inspected at the 4-5 year mark can remain in the NEIEN record if the site visit shows that the buffers are established, and they are included in the spot check protocol (similar to cost-share practice) outlined in Part 2.

V. Verification Guidance for Agricultural Tree Planting

1. *Verification methods for cost-shared agricultural tree planting will utilize the verification programs already implemented for cost-share contracts.*

    - For purposes of verification, this practice will follow the BMP Verification Guidance put forth by the Agriculture Workgroup.
    - For tracking and crediting purposes, 100 trees planted equals one acre of practice (the same as for expanded urban canopy).
    - For plantings over an acre, a forester-developed planting plan is recommended.

VI. Background on Forestry Practices on Urban Lands

Bay jurisdictions have had urban forestry programs for the past ~30 years, having been established after the 1978 Cooperative Forestry Assistance Act and other means. These programs provide assistance to improve the health of urban trees including tree planting and maintenance to ultimately expand the urban tree canopy. There are multiple grant opportunities in the Bay watershed to encourage the development of urban forestry programs and urban tree canopy expansion. In many cases, grassroots urban forest programs have developed because individuals and organizations realize the many benefits (water quality being one) that urban trees bring people and because the investment by the programs in planning and maintenance of trees has been shown to pay back in multiples.

Increasing tree cover in communities is one of the most sustainable and cost-effective practices to improve both societal well-being and the environment.

Tree planting can be a cost-effective way to meet regional air quality goals and is increasingly included in air quality improvement plans as a voluntary measure. In 2007, the Chesapeake Bay Executive Council committed to having 120 communities develop urban tree canopy expansion goals by 2020. The Chesapeake Bay Agreement of 2014 will have a goal to plant 2,400 acres of urban forest by 2025. Urban forest buffer restoration is another practice that is increasing in importance: i.e., it has not been reported regularly in the past, but is expected to be a significant part of certain states WIPs.

Many localities in the watershed have had assessments done of their tree canopy and set goals to increase their urban tree canopy (Figure B-1). In recent years, the number of tools available for assessing and monitoring an urban canopy has soared, especially those using aerial imagery and software technology. In 2004, the Science and Technology Advisory Committee (STAC) held a workshop introducing these tools (STAC 2004). One leading program, the iTree suite of tools, is a free, peer-reviewed software suite from the USDA Forest Service that provides urban forestry analysis and benefits assessment tools (www.itree.com). Even more basic is the use of Google Earth® imagery to view tree canopy.

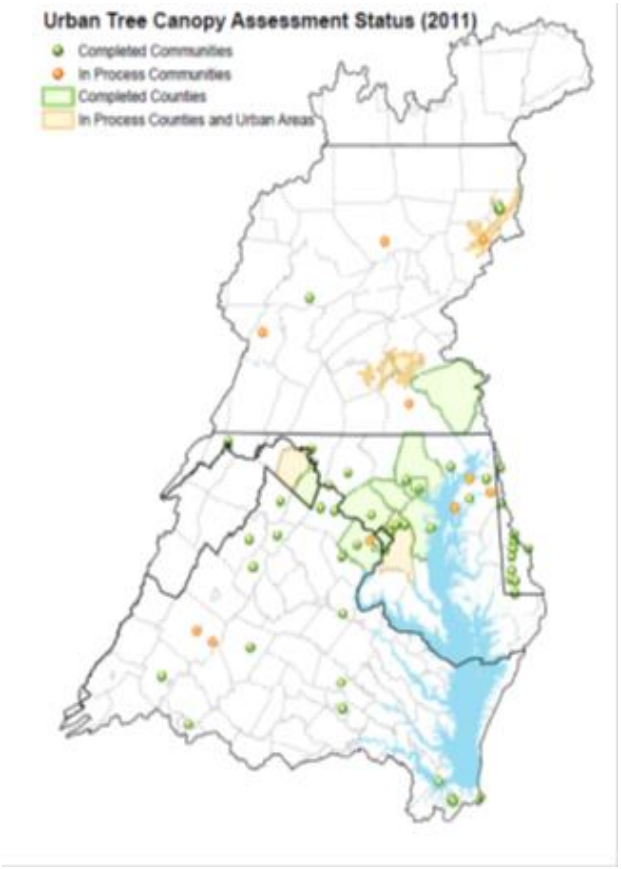


Figure B-1. Urban tree canopy assessment status (2011) in the Chesapeake watershed.

The two urban forestry practices, Expanded Tree Canopy and Urban Riparian Forest Buffers, overlap with practices covered by the BMP Verification Guidance of the Urban Stormwater Workgroup. As noted in that guidance, the practices may be implemented as part of a program to meet regulatory requirements, such as Clean Water Act MS4 permits. Tree planting has received a boost as federal, state and local stormwater requirements have strengthened provisions for maintaining and restoring natural hydrologic conditions in developed and developing areas.

Expanded Tree Canopy Description: Expanding tree canopy is the overall percent of tree cover in a geographically defined locality on developed land. Credit is applied according to the number of new acres (net gain) of tree cover, i.e., amount of canopy expansion. If trees are not planted in a contiguous area, such as for street trees, then number of trees can be converted to acres using the following conversion factor:

100 trees = 1 acre of new tree cover

All tree planting data is aggregated and submitted to the state by a locality, for further aggregation to the CB model per land-river segment.

Urban Forest Buffer Description: An area of trees at least 35 feet wide on one side of a stream, usually accompanied by trees, shrubs and other vegetation that is adjacent to a body of water. An urban riparian forest buffer is any riparian buffer not in an agriculture or forest setting-- it is on developed land.

Current Procedures: At present, reporting of urban forestry practices by jurisdictions is not well-established, and procedures have been limited. In particular, there are questions about follow-up inspections and maintenance after initial planting. Also, there has been no means of assessing that tree planting projects are resulting in a net gain of tree cover.

VII. Verification Guidance for Expanded Tree Canopy

The Urban Stormwater Workgroup BMP verification guidance outlines a number of general principles that apply to Expanded Tree Canopy when used by a locality for stormwater management. Those that pertain to Tree Canopy include: 1) verification methods will be appropriate for the level of enforcement (e.g., consent decree or voluntary homeowner practice; 2) maintenance is essential to performance; and 3) BMP reporting must be consistent with the CBP standards.

The Forestry Workgroup adds the following forestry-specific guidance:

1. Establish urban forestry partner and support mechanisms

- For a decentralized practice, primarily on private land, a local urban forestry partner would improve confidence in tree survival/health and accuracy in tree reporting in a defined locality. An urban forest partner may be a local government entity, or a non-governmental organization with necessary expertise who works cooperatively with the locality. The partner would be endorsed by the state forestry agency, which provides oversight and support with training, tools, etc. In turn, urban forest partners can provide outreach and technical assistance on urban tree planting, tree care, and other issues that arise.

2. Urban forestry partner tracks and reports new acres of tree canopy in locality

- For new plantings, the following information should be collected: 1) acres of planting, 2) dates of planting, and 3) anticipated stature of trees at maturity (e.g. large or small). Urban tree canopy plantings can be credited once planting is confirmed. All plantings over ½ acre should be site-checked by the urban forestry partner.
- For natural regeneration acres, two similar pieces of data should be recorded: 1) acres of treatment, and 2) date started. But because of the difficulty to establish tree canopy in this way, this information should be reported for credit only after a 4-year maintenance period. Regeneration areas can be mowed, fenced or signed as deemed necessary.
- To credit new acres reported voluntarily by a landowner or other partner, the states should develop a strategy similar to approaches for some other urban practices. A 20% spot check is recommended. Protocols should indicate how much total acreage is pro-rated by survival rate, by information source, or other means of uncertainty.

3. Urban forestry partner should maintain new areas of canopy

- New urban plantings can have a high rate of mortality, succumbing to weed competition, dehydration, physical damage, or other injury. Removing competing vegetation is often necessary. A planted tree (e.g., one in a tree pit or open-planted, i.e., non-contiguous) that dies should be replaced, or removed from the NEIEN database.

- For natural regeneration areas, maintain desirable tree growth until a density of 100 trees per acre is reached and the trees are of a height where they can grow unhampered (above competing vegetation and deer browsing level of 4 feet). Area of intended tree canopy via natural regeneration should be a minimum of 1/4 acre (or adjoin to existing forest).

4. *Reported practice should represent a net gain*
   - Every 5 years, a locality should re-assess the tree canopy in its defined boundaries to show that there has not been a decrease in overall canopy. This is important especially since tree canopy losses may occur despite good policies and practices for urban forestry. Ongoing problems for tree canopy are the expansion of invasive pests such as emerald ash borer, required tree trimming for electrical reliability standards, and natural aging of trees.
   - If the tree canopy decreases, the acres of progress credited during the prior period (5 year max) should be reduced by the percentage of decrease (e.g., 50 new acres planted over 5 years, 5% decrease found, 47.5 acres remain credited).

High-resolution imagery (1 or 2 meter/pixel) is becoming more common and can help a locality discern changes in tree canopy. There are experts available to help interpret the imagery and non-expert tools such as iTree Canopy (http://itreetools.org/) and the Land Image Analyst can be used as a cost-effective means of sampling and doing a quick assessment of canopy cover.

iTree Canopy is designed to allow users to easily and accurately estimate tree cover within identified localities. This tool randomly lays points (number determined by the user) onto Google Earth imagery and the user then classifies what cover class each point falls upon. The user can define any cover classes that they like and the program will show estimation results throughout the interpretation process. The more points completed per size of the area to be sampled, the better the cover estimate. From this classification of points, a statistical estimate of the amount or percent tree

Example Canopy Assessment from iTree Canopy

To illustrate how to use iTree Canopy to estimate canopy cover, let us assume 1,000 points have been interpreted and classified within a city as either "tree" or "non-tree" as a means to ascertain the tree cover within that city, and 330 points were classified as "tree".

To calculate the percent tree cover and Standard Error (SE), let:

N = total number of sampled points (i.e., 1,000)

n = total number of points classified as tree (i.e., 330), and

p = n/N (i.e., 330/1,000 = 0.33)

q = 1 – p (i.e., 1 - 0.33 = 0.67)

SE = $\sqrt{}$ (pq/N) (i.e., $\sqrt{}$ (0.33 x 0.67 / 1,000) = 0.0149)

Thus in this example, tree cover in the city is estimated at 33% with a SE of 1.5%.

This process should take an average user several hours to complete and is requested once every five years.

canopy can be calculated along with an estimate of uncertainty of the estimate (standard error (SE)). A confidence interval of 95% should be reached to show no loss of canopy in the 5 year period.

5. State oversight of reporting localities

To provide accountability, state forestry agencies regularly spot-check a subset of a locality/urban forest partner BMP project files and/or 5-year assessments of net gain for accuracy and thoroughness. This may also entail site visits to tree planting sites on record. The state oversight process needs to be transparent and publicly accessible so that NGOs, watershed groups and other stakeholders can be confident that BMP implementation is real. Improvements on reporting are suggested. The state forestry agency should coordinate with the state MS4 oversight program, where local partners are implementing tree planting BMPs regulated by that program.

VIII. Verification Guidance for Urban Riparian Forest Buffers

- Partner should maintain information at local level of each new urban riparian forest buffer.
- For new plantings, data to be recorded should include: location (lat/long) and name of property, 2) acres planted (if appropriate) and width, and date(s) planted.
- For natural regeneration acres, data to be recorded should include: location, acres of treatment, width, and date started. Naturally regenerating urban buffers are reported after 4 years of establishment if there are 100 or more live native trees per acre.
- All new buffer areas will be visited by the local urban partner.

1. *Urban forestry partner maintains riparian buffer*
    - New buffer plantings can have a high rate of mortality, succumbing to weed suppression, dehydration, physical damage, or other injury. Competing vegetation should be removed.
    - Reporting localities should be 80% confident that maintenance is occurring to avoid impacts to water quality pollution reduction efficiencies. Spot checking and/or statistical sampling is recommended. The sampling design should focus on specific maintenance issues that have the biggest potential impact on water quality such as concentrated flow. See guidance for maintenance of Agricultural Riparian Forest Buffers for more direction.

2. *Reported practice represents a net gain*
    - Assessment of total urban forest buffer cover in a locality should be done every 5 years to ascertain that there is not a net loss of urban buffer. A procedure like the one described for Expanded Tree Canopy (using iTree Canopy) is recommended. For this practice, iTree Canopy data points would be located in the riparian area of a given locality. Other software may be equally useful in demonstrating there has not been a loss of buffer. If a loss of urban buffer in a locality is detected, the credits received over that 5-year period will be deducted by the same amount.

3. State oversight of reporting localities

- To provide accountability, state forestry agencies should regularly spot-check a locality/urban forest partner BMP project files on urban forest buffer establishment and/or 5-year assessments of net gain in for accuracy and thoroughness. This may also entail site visits to buffer sites on record. The state oversight process needs to be transparent and publicly accessible so that NGOs, watershed groups and other stakeholders can be confident that BMP implementation is real. An oversight report should be communicated with the locality/urban forest partner to underscore what is being done well and what needs improvement.

IX. Background on Forest Harvesting BMPs

Forest Harvest BMPs Description: Forest harvesting practices are a suite of BMPs that minimize the environmental impacts of logging, including road building and site preparation. These practices can greatly reduce the suspended sediments and other pollutants that can enter waterways as a result of timber operations. The CB model currently assumes an average of 1% of forest is harvested in any given year, unless more accurate data are supplied by the state. The modeled pollution load from forest harvesting is reduced based on the annual number of acres of forest harvesting BMPs reported.

Current procedure: All States have adopted recommended BMPs for timber harvesting and forest management activities (also called Silvicultural BMPs) that have the potential to impact water quality. These water quality BMPs have common elements although they may vary from state-to-state and their use is site dependent. For the purposes of monitoring, BMPs are grouped by area of concern such as:

- Roads and timber loading areas
- Stream crossings
- Stream Management Zones or Riparian areas
- Wetlands
- Use of chemicals

Consistent and reliable data on the use and effectiveness of forest harvest BMPs are the most important evidence of a state's compliance with the Clean Water Act during timber harvest, and extensive protocols are available for monitoring (Welsh et al. 2006, Southern Group of State Foresters 2008). Such monitoring may be part of a state's nonpoint source management program, Sec. 319 of the Clean Water Act. EPA approves state harvesting guidelines which considers forest harvest BMP compliance to be voluntary when coupled with education and monitoring (West Virginia, where BMP compliance is mandatory, is an exception).

On-site visits of harvesting operations are routinely made by state agency foresters in most parts of the Bay watershed. If the forestry agency does not receive permission to access harvest sites and is not the authorized agency, request certification from the authorized agency. BMPs are widely implemented in practice and crediting should have every opportunity to be verified and credited.

Some forest harvesting BMPs are designed to have a short life—only for the duration of the harvest operation (e.g., temporary stream crossings), while others are intended to last several years-- until the forest grows back (e.g., erosion control plantings).

Public Land vs. Private Land: In some states, forest harvesting is closely controlled and monitored on both public and private land. Other states control harvesting on public lands and can thus monitor BMP implementation there, but have no accessible record of where private forests are being harvested or what BMPs are used during those harvests. Public forests in all states are typically models in following BMPs, and many in the watershed comply with third-party certification programs such as Forest Stewardship Council to minimize impact. Only a small percentage (~4-8%) of private forest lands ascribe to third-party certification (through American Tree Farm membership or on their own).

As roughly 95% of harvesting is on private lands, it is important to apply the following verification guidelines to those lands. In some states, there is no authority for state forestry agents to access private lands after harvest. If states are not able to obtain permission to check enough randomly selected privately-owned harvesting sites, no forest harvesting BMP credit can be sought for those lands.

X. Verification Guidance for Forest Harvesting BMPs

1. *Track total acres of forest harvest BMP implementation, or rate of implementation, on private land, and conduct site visits after harvest to ensure proper installation. There are several options for tracking BMP implementation:*
    - State forestry agency documents that the project sites were visited and evaluated for forest harvest BMP establishment within 6 months of site preparation (or long enough to see results) and submits actual acres to NEIEN annually.

OR

    - State forestry agency determines average rate of BMP implementation by on-site sampling (spot-checking) private land harvest sites within 6 months of harvest activity. A rate of implementation is determined and can be used for up to 5 years. Derived, assumed, or anecdotal information on implementation is insufficient. A good source of information on designing a statistically valid sampling procedure for implementation monitoring and analyzing the results can be found in "*Sampling and Estimating Compliance with BMPs*" produced by the Southern Group of State Foresters.

OR

    - State forestry agency will determine an average rate of implementation by conducting a review of forest harvest records every 5 years. If using a sampling regime to determine rate of BMP implementation, use a confidence level of 80% (+/-5%).
        - Forestry staff or Cooperative Extension Offices can assess the overall rate of BMP implementation by using data collected from local forest district offices or county environmental protection offices. Harvest plan reviews and harvest permits are examples. BMP implementation rates can be credited after the first such review has been completed.

- To complement a review of forest harvesting records, it is also recommended to interview local timber operators and forestry field staff to document consistency of practice implementation. Photographs of BMPs and some site visits are highly encouraged to further complement the analysis of harvest records.

2. *States should describe their existing and planned inspection programs for Forest Harvest BMPs in Verification Protocols.*

3. *Monitor use of forest harvest BMPs for Process Improvement*
   Assessing forest harvesting BMP implementation and function, and looking at specific categories of BMP practices, will address issues such as training needs for forestry personnel and forestry practitioners. It can also provide insights about whether BMPs themselves are adequate or need improvement. States should describe how they plan to analyze their verification of forest harvest BMPs—e.g., how inspections and data records could more accurately capture what is happening with forest harvest BMP's during the most vulnerable periods (i.e., during a storm event soon after harvest).

Urban Stormwater Verification Guidance

Version: Final, July 16, 2014

This section describes guidance on how to verify the performance of urban BMPs in the Bay watershed, and is organized into eight parts:

1. The Need for BMP Verification and the Chesapeake Bay Program partners' Process to Define it.
2. Key Verification Definitions
3. Background on Urban BMP Verification
4. Verification Guidance for BMPs Located in MS4 areas
5. Verification Guidance for BMPs Located in non-MS4 areas
6. Verification Guidance for Non-Regulatory BMPs
7. Verification Guidance for Legacy BMPs
8. Process for Developing Urban BMP Verification Protocols

The guidance has been revised to incorporate comments provided by the Chesapeake Bay Program partners' BMP Verification Review Panel (CBP-VRP, 2013) and feedback submitted on the May 2014 draft BMP Verification Framework.

Part 1: The Need for Verification and the Chesapeake Bay Program partners' Process to Define it

At the request of the Water Quality Goal Implementation Team (WQGIT), the Urban Stormwater Workgroup (USWG) devoted much of 2012 and 2013 to developing guidance on urban BMP verification. Eight drafts of this guidance were made in response to verbal and written comments by local and state Chesapeake Bay Program partners. In addition, recommendations for BMP reporting, tracking and verification were an integral element of the deliberations of four urban BMP expert panels:

- Stormwater Retrofits
- New State Stormwater Performance Standards
- Urban Nutrient Management
- Stream Restoration

This section represents a synthesis of the consensus reached by the Workgroup on urban sector verification issues.

Part 2: Key Definitions for Urban BMP Verification

The following terms are defined to clarify the issues related to urban BMP verification.

Urban BMPs: In this context, they are defined as stormwater practices for which definitions and removal rates have been developed and approved through the Bay Program BMP review protocol (WQGIT, 2010). These urban BMPs fall into four broad categories:

1. *Traditional stormwater BMPs* that were historically installed through a local stormwater plan review process in response to state stormwater requirements (primarily stormwater treatment (ST) practices as defined by SPSEP, 2012).

2. *New runoff reduction BMPs* that will be implemented in the future to meet new state stormwater performance standards that typically go through a local stormwater review process (primarily runoff reduction (RR) practices as defined by SPSEP, 2012).

3. *Non-structural or operational BMPs* that are typically applied by a municipal agency (e.g., street sweeping, urban nutrient management, illicit discharge elimination).

4. *Restoration BMPs* installed by localities to treat existing impervious cover (e.g., stormwater retrofits and stream restoration).

Regulated BMPs: Refers to any BMP that is installed in a jurisdiction that has a Phase 1 or 2 Municipal Separate Storm Sewer System (MS4) permit. These permits establish a requirement that a locality have a BMP maintenance program and the capacity to inspect all of their BMPs within a portion or all of each permit cycle (typically 5 years). As can be seen in Figure B-2, however, only a portion of the developed/developing land in the Bay watershed occurs within communities that are regulated under MS4 permits.

Semi-Regulated BMPs: Refers to any BMP that is installed locally under a state construction general permit (CGP) outside of a MS4 community. While the permit applicant must sign an agreement that they will maintain the BMP, the locality is not required to have an inspection program to enforce maintenance, and the state may not have sufficient staff resources to do so on their behalf.

National Environmental Information Exchange Network (NEIEN): In the context of the Chesapeake Bay partnership, a state-federal data sharing partnership to share, integrate and submit BMP data to get credit for pollutant reduction in Scenario Builder. The BMP data is then credited in the Chesapeake Bay Watershed Model to track progress made in overall load reduction within each state. Some of the requirements for submitting BMP data into NEIEN include the geographic location of each individual BMP, as well as the year it was installed and other BMP-specific data to ensure proper tracking and verification.

Non-regulated BMPs: Refers to any BMP that is voluntarily installed in a community that was not triggered by an explicit MS4 requirement or stormwater regulation. Examples might include rain gardens built by homeowners or demonstration BMPs constructed through grants.

Legacy BMPs: Refers to the population of urban BMPs in a community that the state has reported to EPA for inclusion into any past version of the CBWM for sediment or nutrient reduction credit. Legacy BMPs fall into three categories:

- *Actual BMPs with a geographic address*

- *Actual BMPs that lack a specific geographic address*

- *Estimated BMPs* that were projected based on some assumed level of development activity and compliance with state stormwater regulations.

Discovered BMPs: Refers to any BMP that was installed in the past but was never reported to the state or Bay Program, and has not received any prior nutrient removal credit. These often include older BMPs installed prior to the establishment of state BMP reporting systems.

Part 3: Background on Verification of Urban Stormwater BMPs

As part of the development review process, localities in the Chesapeake Bay watershed typically conduct a post-construction inspection of stormwater BMPs to ensure that they are functional, maintain project engineering files and then periodically inspect them to ensure they are still working.

Phase 1 and Phase 2 communities have NPDES MS4 permit conditions which require them to have programs and staff in place to ensure that maintenance inspections are done according to a prescribed cycle. The frequency of maintenance inspections ranges from 3 to 5 years, depending on the permit status of the jurisdiction.

In addition, most MS4 communities have an annual BMP reporting requirement, and often provide aggregate information to the state on the number and type of BMPs that are installed during the reporting period.

Existing local and state procedures to review, inspect and verify many urban BMPs have existed for many years. Some of their common elements are outlined in Table B-9. With some minor adaptations (primarily in the area of reporting and ongoing performance inspection), these existing procedures provide a strong foundation for a reliable BMP reporting, tracking and verification system in the watershed.

Table B-9: Existing Review and Inspection Procedures for Select Urban BMPs *

Urban BMP Type	*Key Procedures*
Stormwater BMPs for New Development or Redevelopment	Detailed engineering review, geotechnical feasibility tests, performance bond, multiple inspections during BMP construction, final inspection to accept the facility, preparation of "as-built" drawing, release of performance bond, prescribed maintenance agreement, creation and maintenance of local BMP file, local reporting to state stormwater authority, routine owner maintenance, periodic regulatory inspections
Erosion & Sediment Control BMPs	Site analysis, detailed engineering review of ESC plan, pre-construction meeting, weekly self-inspection by contractor, routine regulatory inspections (weekly to monthly), final inspection, release of ESC performance bond.
Stream Restoration	Stream reach data collection and analysis, detailed engineering review, state and federal environmental permit review, multiple environmental and engineering inspections during project construction, final inspection and preparation of as-built drawings, post-construction project monitoring, ongoing project maintenance.
Stormwater Retrofits	Generally the same as for new stormwater BMPs, but the inspection and maintenance requirements may be vested with the property owner or the governmental jurisdiction that is financing the retrofit

* the exact procedures will differ somewhat from locality to locality and from state to state, depending on their land development ordinance and review procedures, and state permit and regulatory requirements.

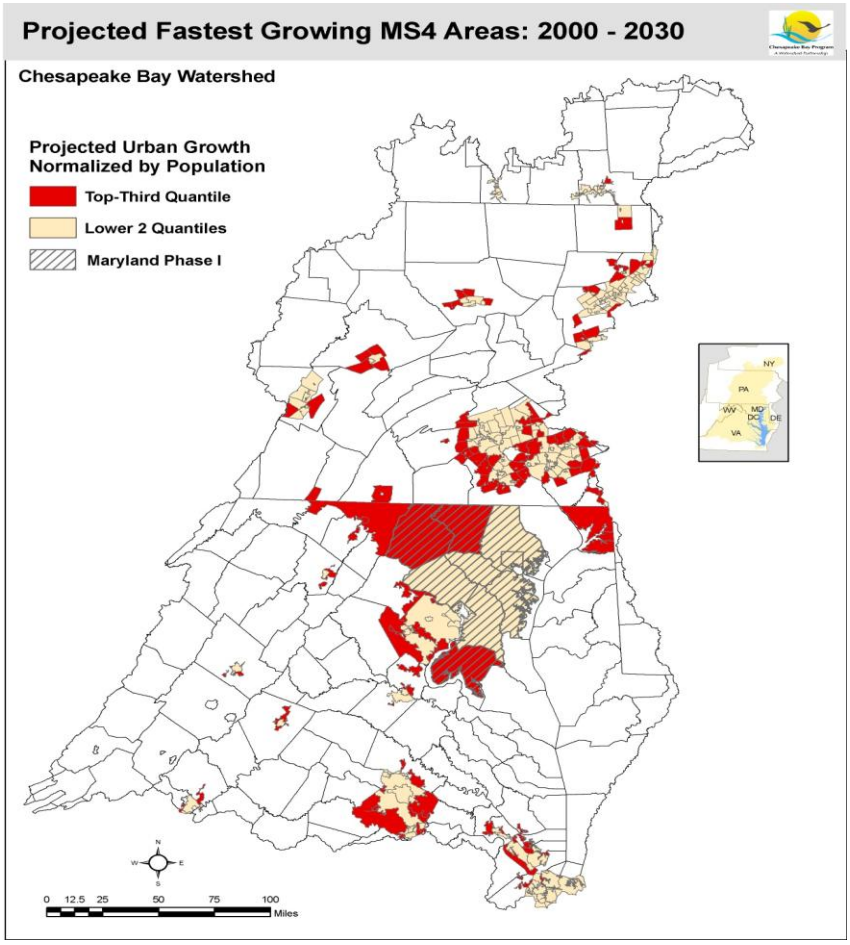


Figure B-2: Distribution of MS4 Communities in the Bay Watershed
Source: Claggett, 2010

Several challenges still need to be addressed to develop an effective verification system for the Bay watershed.

- Larger MS4 communities have an existing urban BMP inventory that numbers in the thousands, with hundreds more being added each year.
- Some Ms4s do not currently report all of the individual BMP information needed by the state to prepare the input deck for the Chesapeake Bay Watershed Model (CBWM), such as Chesapeake Bay Program (CBP) BMP classification, drainage area served, geographic location and year of installation.
- Very few localities have yet digitized their individual BMP files and integrated them within a spreadsheet and/or GIS system.
- In the absence of good geo-spatial data, the prospect for double counting of BMPs is significant, particularly when multiple BMPs of different ages are located within same drainage area. In other cases, BMPs that have failed or don't really meet the CBP BMP definition are counted when they should not be.

- Most non-MS4 localities have little experience in reporting BMP implementation data for new or existing development (e.g., retrofits). These communities are classified as being semi-regulated, in that they have limited authority to inspect or enforce maintenance on private land.

- Several urban BMPs are routinely implemented outside the MS4 permit or local/state/federal stormwater review process, and therefore may not be properly counted or reported (e.g., street sweeping, reforestation, urban nutrient management, tree planting and stream restoration). Localities may need to internally coordinate with multiple agencies and/or departments to accurately report this BMP data.

- Most localities do not currently report on voluntary BMPs that are installed by homeowners or watershed groups, even if they provide them financial or other incentives to do so.

- Most Bay watershed states are just now developing BMP reporting systems to track the BMPs installed by individual localities and federal facilities, and several have not been able to keep up with BMP information submitted by 70 to 400 MS4s in their jurisdiction.

- Up to now, few states have allocated sufficient staff resources to fully enforce MS4 permit maintenance conditions, verify that local BMP information is accurate, and cull out BMPs from the CBWM input deck that are no longer achieving their intended nutrient or sediment removal rate.

- Some urban BMPs are installed in non-regulated areas in the watershed (i.e., not covered by MS4 permits). Consequently some of these communities may not yet have in place all of the legally required BMP inspection and maintenance provisions found in MS4 communities. As a consequence, BMP reporting and verification may be challenging in non-MS4 communities, particularly in smaller communities with limited staff resources.

- Perhaps the greatest weakness of the current system is that current post construction and maintenance inspection efforts are not oriented toward verifying the actual pollutant removal performance of the BMP in the field. Instead, local inspections primarily focus on whether a BMP was installed per design, and that its future condition will not cause harm to public safety and/or cause nuisance problems in the community. Consequently, it will be necessary to develop improved inspection guidelines that utilize visual indicators to verify that the hydrologic performance of the BMP is adequate to still achieve the intended nutrient and sediment removal rate.

- The past assumption is that nearly all structural urban BMPs are permanent in nature. This means that a twenty year old wet pond keeps on performing in perpetuity, with no discount for their age, diminished capacity and lack of maintenance.

Part 4: Guidance for Verifying Regulated BMPs (e.g., MS4s)
The following guidance is offered on 18 aspects of the urban BMP verification process for MS4s in each of the Bay watershed states:

1. *Verification methods will differ depending on the class of urban BMPs (traditional, runoff reduction, operational, and restoration)*. Historically, the Bay Program partners have approved nearly 20 different BMPs in the urban sector, and new expert panels are adding more every year. Consequently, specific verification protocols need to be crafted to address each class of BMPs.

2. *Key Role of Maintenance in BMP Performance*. Regular inspections and maintenance of BMPs are critical to ensure their pollutant removal performance is maintained and extended over time, as well as maintain other local design objectives (e.g., flood control, public safety, stream protection and landscape amenity). Therefore, a core verification principle is to ensure that BMPs are installed and maintained properly over their design life to qualify for their pollutant removal rates. To ensure this, verification protocols are needed to define (1) the cycle for field verification of BMPs and (2) the process for BMP downgrades if maintenance is not performed.

These protocols also need to reflect the recent shift to Low Impact Development (LID) practices in the Bay states, which has fundamentally changed how BMPs are maintained. LID practices require more frequent but less intense maintenance activity, as well as routine inspections to ensure they perform properly over time (CSN, 2013).

3. *Utilize Existing MS4 Framework.* The existing MS4 inspection and maintenance framework should be the foundation of any BMP verification system for the Bay TMDL. Ongoing BMP reporting and maintenance inspections requirements in MS4 permits may need to be adjusted slightly to verify BMP performance, but the modifications should be limited to reduce the administrative burden for local and state agencies, as well as federal facilities.

4. *Removal Rate Tied to Visual Inspections*. The basic concept is that urban BMPs will have a defined time-frame in which the pollutant removal rate applies, which can be renewed or extended based on a visual inspection that confirms that the BMP still exists, is adequately maintained and is operating as designed. An example of how BMP verification can be integrated with ongoing MS4 BMP inspections is shown Figure B-3.

A rapid inspection is conducted to quickly assess urban BMP performance in the field using simple visual indicators. This approach was refined and tested through an extensive analysis of BMPs located in the James River basin of the Chesapeake Bay watershed. More detail on the methods and results can be found in CWP, 2009. The basic form can be modified or adapted to meet the unique BMP terminology and design criteria employed in each Bay watershed jurisdiction. CSN (2013) has also developed a broader visual indicator framework to assess BMP performance.

5. *Verification to Enhance the Pollutant Removal Performance of Existing and Future Local Stormwater Infrastructure Assets*. Field assessments are used to identify which BMPs are working well and which ones require preventative or corrective maintenance to maintain their function. In addition, field verification enables local governments to analyze their historical inventory of private and public stormwater BMPs to identify which individual projects present the best opportunities for additional nutrient reduction through retrofits or restoration.

6. *Applying BMP Data to Inform Adaptive Management.* Real world data collected on actual BMP performance also enables local and state agencies to improve the next generation of BMPs in an adaptive management process (Williams and Brown, 2012). This process can isolate the specific site conditions, design features and maintenance tasks that improve BMP longevity and performance, which can then be incorporated into better design specifications and maintenance practices. Future BMP expert panels could review such data to determine if these improved BMPs would qualify for a higher removal rate.

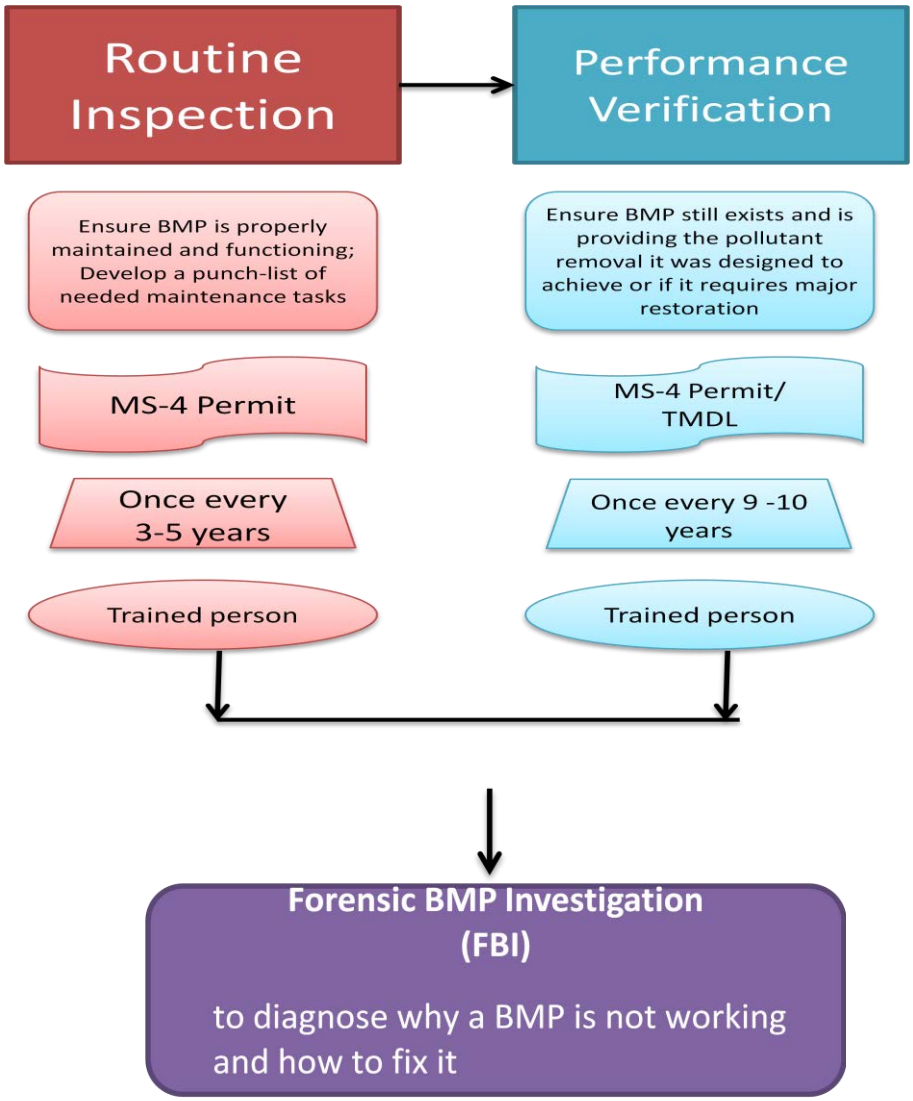


Figure B-3: Relationship of Routine MS4 BMP Inspections to Verification Inspections

7. *BMP Reporting Must Be Consistent with Bay Program Standards.* Each state has a unique system to report BMPs as part of their MS4 permit. In some cases, states are still developing and refining their BMP reporting systems. Consequently, it may not be possible or even desirable to implement a Bay-wide BMP reporting format. However, to get credit in the context of CBWM progress runs, states will need to report BMP

implementation data using Bay Program-approved rates or methods, reporting units and geographic location (generally consistent with NEIEN standards), and periodically update data based on local field verification of BMPs.

8. *More flexible NEIEN reporting standards are needed for certain classes of urban BMPs.* Several operational BMPs, such as street sweeping, urban nutrient management plans, enhanced erosion and sediment control, inappropriate discharge elimination, do not lend themselves well to the specific geographic requirements of NEIEN. In addition, some non-regulated urban BMPs, such as homeowner practices, are so small but potentially so numerous that it is neither practical or useful to give them a specific individual geographic address in NEIEN.

In these situations, it is recommended that only aggregate BMP data be reported for the county/river basin segment in which it occurs. Local governments that report the data are still required to retain specific geographic data records individual practices in order to track and verify them over time.

9. *Initial Verification of BMP Installation*. MS4s and federal facilities will need to verify that urban BMPs are installed properly, meets or exceeds the design standards for its Bay Program BMP classification, and function in the hydrologic manner they were designed for prior to submitting the BMP for credit in the state tracking database. This initial verification is provided either by the BMP designer or the local inspector as a condition of project acceptance, as part of the normal local stormwater BMP plan review process. The BMP data may need to be validated by spot-checks before it is reported to the state. In addition, MS4 communities should outline their BMP review and inspection procedures and staffing in their required MS4 annual reports.

10. *Recommended Cycle for Field Verification of Urban BMPs.* Local inspectors should perform field performance verification for all of their BMPs at least once every other MS4 permit cycle (typically a permit cycle is 5 years). It is recommended that these rapid investigations of visual indicators be integrated into the routine stormwater BMP inspections already required under MS4 permits.

11. *Suggested Process for BMP Downgrades*. If a field inspection indicates that a BMP is not performing to its original design, localities and/or federal facilities would have a defined time frame (e.g., one year) to take corrective maintenance or rehabilitation actions to bring it back into compliance. If a facility is not fixed during the defined timeframe, the pollutant reduction rate for the BMP would be eliminated, and the locality would report this to the state in its annual MS4 report. If corrective maintenance actions were verified for the BMP at a later date, the MS4 could take credit for it then.

12. *Special Procedures for Urban BMPs Used for Offsets, Mitigation and Trading*. Some urban BMPs are built to offset, compensate or otherwise mitigate for impacts caused by development elsewhere in the watershed. Examples include stream restoration mitigation and stormwater retrofit offsets when full compliance with stormwater performance standards is not possible at a new development site.

In other cases, urban BMPs may be built for purposes of trading nutrient credits within a community or a state. Special procedures need to be developed in both cases to prevent double counting of BMPs. In addition, states and localities may elect to require more frequent BMP field inspection for these types of projects to assure they are meeting their intended nutrient reduction objectives.

13. *The Intensity of Verification Efforts Should be in Direct Proportion to Contribution that a BMP makes to overall TMDL Pollutant Reduction in a State's Urban Source Sector.* The workgroup was mindful of the extensive resources needed to support BMP verification, and fully supports the "verification intensity" concept recommended by the CBP-VRP (2013). The basic notion is to prioritize local and state verification resources on the BMPs that produce the greatest load reduction for each state's urban source sector, as reported in their progress runs over time.

This also implies that less verification resources be devoted to BMPs that make only minor overall load reductions, although any BMP should still meet certain minimum criteria for initial inspection and reporting. Operationally, the workgroup defines "minor BMPs" as those that collectively contribute less than 1% to the overall total urban source sector nutrient reduction in the most recent progress run year submitted to the Bay Program.

14. *State Oversight of Local BMP Reporting*. To provide accountability, Bay watershed states should spot-check a subset of local and federal facility BMP project files to validate the reported BMP data. This may entail an analysis of local maintenance inspection records, or joint field BMP inspections to verify performance under their existing MS4 regulatory authority. The state oversight process needs to be transparent and publicly accessible so that NGOs, watershed groups and other stakeholders can be confident that BMP implementation is real.

15. *EPA Review of State Verification Oversight*. EPA Regions 2 and 3, under their existing NPDES MS4 permit oversight role, should periodically review the implementation of state BMP verification protocols to ensure they are being effectively implemented.

16. *Review and Verification of Bay Program partners' BMP Accounting*: The accounting methods and verification procedures used by the Chesapeake Bay Program Office must be clear and transparent so that local governments and the states can readily understand how the urban BMPs they report are being used to calculate pollutant reductions in the Bay Program partners' Chesapeake Bay Watershed Model. Better communication among the Chesapeake Bay Program Office and its state and local government partners will help to improve BMP reporting and ensure a fair representation of State and local program implementation.

17. More Tools and Technology are Needed to Streamline the BMP Verification Process. Actual implementation of the BMP performance verification protocols will require considerable investment in tools and technologies by federal, state and local partners. Some major needs include:

- Development of visual indicators to rapidly assess BMP performance in the field
- Training and certification programs for the "verifiers" that go out in the field

- GIS/website platforms to upload BMP data to local and state databases
- Quality control checks to validate the uploaded data

18. Urban BMP Definitions Preclude the Need for "Functional Equivalency". The policy of the USWG has been to develop Bay-wide urban BMP definitions that can be easily interpreted in the context of each individual Bay state's stormwater design manual and regulations (i.e., sizing and design specifications for individual urban BMPs). Each Expert Panel has developed detailed protocols to estimate removal rates for individual practices based on common design and sizing elements for that class of BMP (see SPSEP, 2012 and SREP, 2012). The BMP design specification in each Bay state are very prescriptive as to the minimum sizing and design criteria that each urban BMP must meet in order to receive permit approval. Consequently, the issue of "functional equivalency" among BMPs, as defined by the agricultural sector in the Chesapeake Bay, does not apply to the urban sector.

Part 5: Guidance for Verification for Semi-Regulated BMPs

The Workgroup created several options to address verification for semi-regulated BMPs (see definition in Part 2). These BMPs are typically installed locally under a state construction general permit (CGP) outside of a MS4 community. Some of these semi-regulated communities are not required to have an inspection program to enforce maintenance, or rely on the state to do it on their behalf (who in turn, may currently lack inspection/enforcement resources). In general, states should focus verification accountability efforts in the fastest growing semi-regulated communities, since they will produce the greatest number of BMPs reported.

The following options are recommended in these situations:

Option 1: Local/state agency or federal facility follows the verification inspection process outlined in Part 4 and gets the same credit as a MS4 community.

Option 2: Local or third party performs verification inspections on a sub-sample of their BMP inventory at least once during the prescribed credit duration of the BMP. Non-MS4 communities may elect to reduce the scope of their visual inspections by sub-sampling a representative fraction of their local BMPs and applying the results to their entire population of BMPs that are credited in the CBWM. The sub-sampling method must be designed to have at least an 80% confidence level that the BMPs are reported accurately. There are several well accepted approaches to determining the sample size. These include using a census for a small population of BMPs, imitating a sample size of similar studies, using published tables, and/or applying formulas to calculate a sample size.

Option 3: State or third party conducts a sub-sample to verify BMPs reported within several non-MS4 communities, and applies the results to reported BMP data in other comparable non-Ms4s in their portion of the Chesapeake Bay watershed.

If a local government or federal facility fails to perform verification inspections, it will receive a gradual downgrade in BMP performance over time. Full performance credit will be given for the first five years, followed by a 20% downgrade each year over the next five years, such that entire BMP credits expires after ten years. Hopefully, smaller communities will develop effective verification programs over the next decade to prevent the downgrades from occurring.

Given the importance of BMP verification, states may wish to allocate some of their Chesapeake Bay Regulatory and Accountability Program (CBRAP) grants to support BMP targeting and verification efforts in targeted non-MS4 communities.

Part 6: Guidance for Verifying Non-Regulatory BMPs

Non-regulatory refers to any BMP that is voluntarily installed in a community (i.e., not triggered by a MS4 permit requirement or stormwater management regulation). The most common examples are homeowner BMPs that are installed on private land (e.g., rain gardens, permeable pavers, downspout disconnection, etc.). To promote greater engagement by land owners in Bay restoration, the work group developed streamlined verification procedures for this class of non-regulatory BMPs (USWG, 2013) which is considered a minor source of state-wide urban sector nutrient reductions, as defined by the CBP-VRP (2013).

The basic premise is to simplify the homeowner BMP reporting process while still retaining a high degree of verification rigor, using the following measures:

- Allow localities to aggregate individual homeowner BMP data into a single practice at the county level, which is then reported to the state without any specific geographic location data (apart from the river-basin segment in which it occurred).

- To receive credit, local governments must maintain records for each individual homeowner BMP, including contact information and geographic information (lat/long or street address).

- The actual installation of each homeowner BMP must be field-verified by the local government or designated third party at the time of construction, and homeowner submitted BMP data will require validation, by spot checking it against typical default values for the practice.

- The credit duration for homeowner BMPs has been reduced to 5 years as compared to the 10 years afforded to larger retrofits (UREP, 2012). The credit can be renewed based on verification that the practice still exists and is working.

- Local governments may opt to use the sub-sampling approach outlined in Part 5, Option 2 of this memo. Alternatively, they may request homeowners to submit digital photos to confirm their practices, with the final decision on BMP condition made by the locality.

Part 7: Guidance for Verifying Legacy BMPs

The Workgroup discussed the process by which states and MS4 communities would account for both legacy and discovered BMPs.

Legacy BMPs are those that have been reported to EPA for inclusion into any past version of the CBWM for reduction credit over the past two decades. The goal over time is to clean up local and/or state BMP databases so that all entries are actual BMPs with a geographic address that can be subject to inspection verification. This implies that desktop and/or field inspections will be needed to confirm the geographic address of the BMP and determine whether estimated BMPs actually exist. Assembling an actual BMP inventory from historical data is a major task, and may take several years in some communities.

Localities may benefit when the clean up their BMP inventory since it is likely they will discover BMPs that were installed in the past but was never reported to the state for credit in the CBWM. They may also find cost-effective retrofit opportunities involving BMP conversion, enhancement or restoration (SREP, 2012).

The Workgroup noted that the MS4 communities should seek to assess their entire BMP population with two MS4 permit cycles using the methods outline in the recently approved Stormwater Performance Standards Expert Panel report (SPSEP, 2012). The Workgroup also noted that the burden of assessing legacy BMPs could be sharply reduced if the most problematic older BMPs were targeted first. For example:

- Assess all pre-2000 BMPs in first permit cycle, and focus on pre-1990 BMPs in the first two years of that cycle.
- Initially sub-sample their population of BMPs by type and year installed to look for problematic BMP types and design eras, and then focus inspection efforts on the problem BMPs in future years.
- Focus initial efforts to confirm whether estimated BMPs actually exist, and what their current condition is.

Part 8: Process for Developing More Specific BMP Verification Protocols

The process for developing specific urban BMP protocols relies on the work of numerous expert panels, as shown in Table B-10. Additional verification protocols for other urban BMPs will be developed as new expert panels are formed.

Table B-10: Status of Verification Guidance for Individual Urban BMP Categories

BMP Class	BMP Types	Developed By	Status
Traditional Stormwater BMPs (Bay Program-approved)	Wet ponds, Dry ED Ponds, Constructed Wetlands, Bioretention, Infiltration, Filtering Practices, Grass Channels, Bioswales, Permeable Pavement	Use Verification Protocol Developed by Stormwater Performance Standards Panel	Agreed to at 10/16/2012 USWG Meeting
Runoff Reduction Practices	ESD and LID practices installed in response to new state SWM regulations	Stormwater Performance Standards Panel	Approved by WQGIT
Operational BMPs	Urban Nutrient Management	Expert Panel	Approved by WQGIT
	Street Sweeping	Expert Panel	Projected in 2014
	Illicit Discharge Elimination	Expert Panel	Projected in 2014
	Erosion and Sediment Control	Expert Panel	Approved by WQGIT
Restoration BMPs	Stormwater Retrofits	Expert Panel	Approved by WQGIT
	Stream Restoration	Expert Panel	Approved by WQGIT
	Reforestation/Tree Planting	Expert Panel	Projected in 2014
	Shoreline Management	Expert Panel	Projected in 2014

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Wastewater BMP Verification Guidance

Version: May 8th, 2014

A. Need for Verification and the CBP Process to define it

Over the past two years there have been numerous requests and commitments to improve the accountability of actions taken to install BMPs that prevent or reduce the loads of nutrients and sediment to Chesapeake Bay.

- The Citizens Advisory Committee has repeatedly called on the Bay Program partners to provide for transparent and open verification of cost shared as well as non-cost shared best management practices tracked and reported by the watershed's seven jurisdictions.
- The President's Chesapeake Bay Executive Order Strategy committed the U.S. Department of Agricultural (USDA) and the U.S. Environmental Protection Agency (EPA) to develop and implement "mechanisms for tracking and reporting of voluntary conservation practices and other best management practices installed on agricultural lands" by July 2012.
- Within its Chesapeake Bay Independent Evaluation Report, the National Research Council's (NRC) panel put forth a series of five specific science-based conclusions focused on their finding that "accurate tracking of BMPs is of paramount importance because the CBP relies upon the resulting data to estimate current and future nutrient and sediment loads to the Bay."
- The 2010 Chesapeake Bay TMDL's Appendix S outlines the common elements from which EPA expects the watershed jurisdictions to develop and implement offset programs.

In response to these calls for improved BMP verification, the Water Quality Goal Implementation Team formed a BMP Verification Committee, which tasked the six sector workgroups to develop narrative principles and guidance for the jurisdictions as they build and improve upon their existing verification programs. As a part of its purview, the Wastewater Treatment Workgroup (WWTWG) was instructed to address wastewater treatment facilities, combined sewer overflow areas, and advanced on-site treatment systems.

B. Key Verification Definitions

The following terms are defined to clarify issues related to wastewater BMP verification.

The National Pollutant Discharge Elimination System (NPDES) permit program, as authorized by the Clean Water Act (Section 402), controls water pollution by regulating point sources that discharge pollutants into waters of the United States. Point sources are discrete conveyances such as pipes or man-made ditches. Individual homes that are connected to a municipal system, use a septic system, or do not have a surface discharge do not need an NPDES permit; however,

industrial, municipal, and other facilities must obtain permits if their discharges go directly to surface waters. In most cases, the NPDES permit program is administered by authorized states.[1]

Wastewater Treatment Facilities are municipal sewage treatment facilities and industrial facilities with direct discharges to waters of the United States. These facilities can be classified as *significant* or *non-significant* based on their treatment volume.

> *Significant facilities* are dischargers that are subject to NPDES permits for nutrient pollutants and meet one of the following criteria.
>
> - District of Columbia - Blue Plains Wastewater Treatment Plant
> - West Virginia, Delaware and New York - Facility treating domestic wastewater and the design flow is greater than or equal to 0.4 million gallons per day (MGD).
> - Pennsylvania - Facility treating domestic wastewater and discharging greater than or equal to 0.4 MGD.
> - Maryland - Facility treating domestic wastewater and the design flow is greater than or equal to 0.5 MGD.
> - Virginia - Facility treating domestic wastewater with a design capacity of greater than or equal to 0.5 MGD west of the fall line or 0.1 MGD east of the fall line or an industrial facility discharging an equivalent load in either location.
> - Industrial facilities with a nutrient load equivalent to 3,800 total phosphorus (TP) lbs/year or 27,000 total nitrogen (TN) lbs/year.
> - Any other municipal and industrial wastewater treatment plants identified as significant facilities within a jurisdictional Watershed Implementation Plan (WIP).
>
> *Non-significant facilities* are municipal or industrial dischargers that do not meet the above criteria for significant facilities.

Combined Sewer Overflow (CSO) areas are communities or portions of communities with combined sewer systems that convey both stormwater and wastewater in the same underground system of drains and pipes. Combined sewer systems are designed to overflow occasionally and discharge excess untreated wastewater directly to nearby streams, rivers or other water bodies.

> A *Long Term Control Plan* is a phased approach for control of combined sewer overflows that will ultimately result in compliance with the Clean Water Act requirements.

Septic systems are on-site systems that provide basic storage and treatment to a household's or a development's sewage and discharge into ground. Some septic systems are *Advanced On-Site Wastewater Treatment Systems* that provide additional nitrogen reduction beyond that of a conventional septic system.

Advanced On-Site Wastewater Treatment Systems can be a range of technologies that provide denitrification treatment and reduce nitrogen discharges from the systems.

[1] http://cfpub.epa.gov/npdes/

C. Background on Verification in the Wastewater Sector

Wastewater treatment facilities, including municipal sewage treatment facilities and industrial facilities, contributed 17.4 percent of the total nitrogen (TN) and 16.3 percent of the total phosphorus (TP) loads delivered to Chesapeake Bay tidal waters in 2011. Of these total nutrient loads from wastewater dischargers, the 468 *significant* facilities contributed 90 percent of nitrogen and 72 percent of phosphorus. The remaining 10 and 28 percent of the TN and TP loads, respectively, came from the estimated 5,215 *non-significant* facilities. In 1985, wastewater facilities accounted for 27.6 and 38 percent of the respective TN and TP loads to the Bay. By 2011, the total wastewater loads to the Bay were reduced 51% for TN and 70% for TP from 1985 levels. This significant decline in point source loads is one of the major success stories of Bay restoration and is the result of many factors, including the rigorous implementation of new technologies, the accountability of the NPDES permitting program, and reliable sources of funding.

In the Chesapeake Bay watershed, there are currently 50 active reported *combined sewer overflow* (CSO) communities. A total of 64 CSO areas have been tracked by the Bay Program, with 14 of them currently documented as eliminated. In 2011, based on modeling estimates, the remaining 50 CSO areas contributed 0.57 percent of the total nitrogen (TN) and 0.87 percent of the total phosphorus (TP) loads delivered to Chesapeake Bay tidal waters.

The Chesapeake Bay Program estimates that about 25 percent of the homes in the Bay watershed have *on-site treatment/septic systems* that provide basic treatment to household wastewater. Based on the Partnership's Phase 5.3.2 Chesapeake Bay Watershed Model, these on-site treatment systems contributed approximately 8.3 million pounds or 3.4% of the total nitrogen load to the Bay in 2011.

The existing national and state regulatory systems for wastewater treatment facilities and CSOs meet or exceed the Bay Program partners' BMP verification principles through a rigorous system of permits, inspections and monitoring requirements that ensure accountability, proper design, implementation, operation and maintenance. For on-site treatment systems, the Workgroup's recommended verification guidance is based on the best existing regulations and programs. Verification through existing regulatory programs will confirm if the upgraded wastewater facilities, CSOs, or on-site treatment systems are designed, installed, and maintained over time and meeting their assigned load reduction targets.

The Workgroup's process to develop these verification principles and guidance was as follows:

1. Evaluate the existing verification/inspection programs among the seven Chesapeake Bay watershed jurisdictions;

2. Determine what needed to be improved to meet the Bay Program partners' BMP verification principles; and

3. Develop principles and guidance based on the best existing BMP verification/inspection programs that met or exceeded the BMP verification principles for the jurisdictions' use as they build upon their existing verification elements.

At multiple points throughout the process, the Workgroup has received and considered feedback from its members and interested parties, together with substantive input from the BMP Verification Committee, BMP Verification Review Panel, and Bay Program staff.

D. Verification Principles and Guidance for Wastewater Treatment Facilities

All significant facilities have or will have nutrient permit limits and specific nutrient monitoring requirements in place under the Chesapeake Bay TMDL. These numeric nutrient limits will ensure that significant wastewater treatment facilities continue to provide the most reliably verified load reductions in the restoration effort.

The NPDES compliance system and monitoring requirements provides the most stringent verification for implementation of a facility upgrade. Some Chesapeake Bay watershed jurisdictions also have or will have individual nutrient permit limits or monitoring requirements on some of their non-significant facilities.

The wastewater load reduction goals in the Chesapeake Bay TMDL and jurisdictions' WIPs for the most part are applied to significant facilities. With the exception of Maryland, there are currently no load reduction goals for non-significant facilities in the remaining six Chesapeake Bay watershed jurisdictions; there are only aggregate waste load allocations set at existing loads. Maryland and Virginia NPDES permits for new, expanding, and certain upgraded non-significant facilities include nutrient wasteload allocations and discharge monitoring report (DMR) reporting requirements.

For non-significant wastewater facilities, the existing federal and state NPDES regulations and the DMR reporting system will provide sufficient verification. The DMRs will be used to report the load reductions from a non-significant facility that undergoes any upgrades or offsets new or expanding flows. Jurisdictions will annually track the universe of nutrient- and sediment-contributing non-significant wastewater discharging facilities against established inventories for aggregated waste-load allocations, reporting on loads using the various mechanisms described in jurisdictions' WIPs. Jurisdictions will document and report any allocation redistribution or changes that result from trading or offsets.

The existing national regulations and delegated state NPDES permitting programs have very specific verification and inspection requirements for wastewater treatment facilities, which meet or exceed the Bay Program partners' BMP verification principles. The verification/inspection programs for all non-significant wastewater treatment facility upgrades will rely on the existing NPDES regulations and DMR reporting system.

Table B-11 below provides a summary of the Workgroup's recommended approach for the jurisdictions' wastewater treatment facilities.

TABLE B-11 – Summary of recommended verification principles and guidance for wastewater treatment facilities

	Significant Wastewater Treatment Facilities	***Non-Significant Wastewater Treatment Facilities***
Principles and guidance for the	Monitoring and monthly reporting of flows and loads via DMRs. In addition, (a) annual	• The existing NPDES DMRs will be used to report the load reductions due to BMPs for non-significant wastewater treatment facilities

jurisdictions	loading reports are also submitted where trading or general permit conditions apply to a facility, and; (b) annual WIP reporting also applies**.**	that include upgrades and offsets of new or expanding non-significant facilities. • Track the universe of nutrient- and sediment-contributing non-significant facilities against established aggregate wasteload allocations, annually report loads using various mechanisms including those described in the jurisdictions' WIPs and document any allocation redistribution or changes in reporting structure that result from trading, offsetting, or assimilation by other facilities.
Applicable jurisdictions	All seven jurisdictions.	All seven jurisdictions.
How to apply the principles and guidance	Use existing NPDES DMR and state-defined procedures. Document those procedures in the jurisdictions' quality assurance project plans (QAPPs) submitted to EPA.	Use existing NPDES DMR and state defined procedures. Document those procedures in the jurisdictions' QAPPs submitted to EPA.

E. Verification Principles and Guidance for Combined Sewer Overflows (CSOs)

CSO Long Term Control Plans

Long-term control plans are required by the national CSO control policy to reduce overflows from CSO outfalls (59 FR 18688, April 19, 1994). The existing national regulations and delegated state NPDES permitting programs have very specific verification/inspection requirements for CSOs, which meet or exceed the Bay Program partners' BMP verification principles.

TABLE B-12 – Summary of recommended verification principles and guidance for Combined Sewer Overflow Areas

	Combined Sewer Overflows
Principles and guidance for the jurisdictions	• Construction Verification: properly designed, installed, and maintained by the certified service providers. • Post construction monitoring and inspection. • Existing compliance and enforcement procedures. • Tracking and reporting.
Applicable jurisdictions	All seven jurisdictions.
How to apply the principles and guidance	Use the existing CSO regulatory process.

F. Verification Guidance for Advanced On-site Treatment Systems

There is no national regulation for on-site treatment systems. Existing state regulations or programs vary dramatically among the six Chesapeake Bay states[2], ranging from construction permits to more complex regulation through operating permits with inspection and monitoring requirements. The recommended verification principles and guidance were developed based on the best existing state regulations for on-site treatment system that meet or exceed the Bay Program partners' BMP verification principles.

Verification of on-site treatment systems only applies to nitrogen-reducing treatment systems, or *advanced on-site treatment systems* that are reported by a state for load reduction credit, and not other septic systems that do not receive credit as a BMP. The jurisdictions that intend to seek nitrogen load reduction credit for installation, operation and maintenance of on-site treatment systems will need to adopt and implement the recommended protocols through their regulations (existing or upcoming) or management programs required for advanced on-site treatment systems. These on-site treatment system regulations or programs should have specific maintenance and inspection requirements tailored to specific on-site treatment systems.

Currently, Delaware[3], Maryland[4], and Virginia[5] have advanced on-site treatment system regulations in place (see Appendices A, B, and C, respectively, for detailed descriptions). The District of Columbia has no on-site treatment systems within its jurisdictional boundaries. West Virginia is committed to meeting the Workgroup's minimum verification guidance described in this section if they seek credit for advanced on-site treatment systems. Pennsylvania and New York currently do not plan to seek nitrogen load reduction credit for installation, operation, and maintenance of on-site treatment systems, so they will not need to document verification for these systems unless they wish to seek credit in the future.

Verification of advanced on-site systems will ensure proper installation and continued operation and maintenance of the systems. **Specific requirements (e.g., inspection or sampling frequency) will be based on existing state regulations or will follow the below set of minimum elements for verification based on existing state programs**:

- State or local authorities will verify, track and report proper installation and operation and maintenance of new advanced on-site treatment systems. Verification may also occur through inspections performed by a certified design professional.

[2] The District of Columbia has no on-site treatment systems within its jurisdictional boundaries.
[3] Delaware Department of Natural Resources and Environmental Control, Division of Water, Groundwater Discharges Section, 7Del.C.Ch. 60, Delaware Regulations Governing the Design, Installation, Operation of On-Site Wastewater Treatment and Disposal System (amended January 11, 2014)
http://www.dnrec.delaware.gov/wr/information/gwdinfo/documents/delawarefinalonsiteregulations_01112014.pdf
[4] Maryland Regulation of Water Supply, Sewage Disposal, and Solid Waste. Chapter 02 Sewage Disposal and Certain Water Systems for Homes and Other Establishments in the Counties of Maryland Where a Public Sewage System is Not Available Authority
http://www.dsd.state.md.us/comar/SubtitleSearch.aspx?search=26.04.02
[5] Virginia Regulations for Alternative On-Site Sewage Systems
http://lis.virginia.gov/000/reg/TOC12005.HTM#C0613

- The design and installation of on-site BMP systems will be done and reported by certified service providers and verified in the permitting processes.

- The maintenance and inspection of on-site BMP systems will be conducted and reported annually, or more frequently, by certified service providers and tracked by the authorities. For some technologies, state or local authorities may stipulate an inspection frequency that is less than annual.[6]

- Tracking and reporting through databases managed by state agencies.

Maryland and Virginia already have comprehensive regulations for advanced on-site systems; Delaware amended its regulations, effective January 11, 2014. Key verification elements of these three states' regulations are summarized in Table B-13 below, along with management recommendations from the On-Site Wastewater Treatment Systems (OWTS) Expert Panel. Table 3 relates the three states' program elements with the verification principles and guidance described in the above section. For full details on the Delaware, Maryland, and Virginia programs, please see Appendices A, B, and C, respectively.

TABLE B-13 –Summary of recommended verification principles and guidance for advanced on-site treatment systems

State or local authorities will verify, track and report proper installation and operation and maintenance (O&M) of on-site BMP systems. Verification may also occur through inspections performed by a certified design professional.	*Reference* **Maryland**: COMAR 26.04.02.07 Best Available Technology (BAT) Systems **Virginia**: Sewage Handling and Disposal Regulations (SHDR), 12VAC5-610, and Regulations for Alternative Onsite Sewage Systems (AOSS Regulations),12VAC5-613 **Delaware:** Delaware Department of Natural Resources and Environmental Control (DNREC), Division of Water, Groundwater Discharges, Section 7 Delaware Code Chapter 60, Delaware Regulations Governing the Design, Installation, Operation of On-Site Wastewater Treatment and Disposal System (amended Jan. 11, 2014)
The design and installation of on-site BMP systems will be performed and reported by certified service providers and verified in the permitting process.	**Maryland**: See COMAR 26.04.02.07E-F **Virginia**: Confirmation of installation based on inspections by design professional. **Delaware**: All on-site BMP systems inspected by DNREC and system designer. Certificate of Satisfactory Completion is not issued until specific conditions and requirements are met.

[6] The Chesapeake Bay Program partners' on-site treatment systems BMP expert panel recommended O&M inspection frequencies by practice. Upon approval by the Bay Program's Wastewater Treatment Workgroup (WWTG) and the Water Quality Goal Implementation Team (WQGIT), the recommended inspection frequency will be ready for adoption by the states into their written verification procedures. However, states may stipulate different requirements in their own regulations or programs for on-site BMP systems. For example, Delaware does not require annual inspections for shallow placed pressure dosed, or elevated sand mound systems because they are confident in the performance of these technologies based on decades of experience. Additionally, there are other requirements in place, such as an inspection of any on-site system when a property is sold, that act as sufficient verification mechanisms for these technologies.

The maintenance and inspection of on-site BMP systems will be conducted and reported annually by certified providers and tracked by the authorities. For some technologies, state or local authorities may stipulate an inspection frequency that is less than annual.	*Inspection and O&M frequencies* **Maryland:** COMAR 26.04.02.07D. Once per year. **Virginia**: Once per year for advanced systems <1,000GPD. Retroactive and applies to all systems. **Delaware**: I/A systems less than or equal to 2,500 GPD. Systems permitted after 2/1/2007 inspected every 6 mos. by certified service provider. Systems installed prior to 2/1/2007 do not have to follow O&M requirements, and are inspected by DNREC every three years. On-site systems must also be inspected when a property is sold.
Tracking and reporting through databases managed by state agencies.	Delaware, Maryland and Virginia each maintain their own database.
OWTS Expert Panel recommended O&M frequency, by technology[7]	
Secondary treatment systems certified under NSF Standard 40 Class I or equivalent	Annual inspection may be needed
Intermittent (Single Pass) Media Filters	Annual
Subsurface constructed wetlands/ vegetated submerged beds (VSB)	Annual, with monthly visual inspections of the VSB media, screens, berms, etc. to assess damage from muskrats or similar animals.
Recirculating media filters	Semiannual (twice/year)
Anne Arundel County integrated fixed-film activated sludge (IFAS)	Semiannual
Shallow placed, pressure dosed dispersal	Annual. Additional O&M visits might be necessary. Delaware does not require annual inspections for shallow placed pressure dosed, or elevated sand mound systems because they are confident in the performance of these technologies based on decades of experience. Additionally, there are other requirements in place, such as an inspection of any on-site system when a property is sold, that act as sufficient verification mechanisms for these technologies.
Elevated sand mounds	Annual. Additional O&M visits might be necessary. Delaware does not require annual inspections for shallow placed pressure dosed, or elevated sand mound systems because they are confident in the performance of these technologies based on decades of experience. Additionally, there are other requirements in place, such as an inspection of any on-site system when a property is sold, that act as sufficient verification mechanisms for these technologies.
Permeable reactive barriers	Annual

[7] See previous footnote. Actual O&M or inspection frequency for specific technologies may vary according to states' regulations or requirements.

Verification of Septic Pumping BMP

OWTS Expert Panel recommended keeping septic pumping as a BMP with a 5% TN reduction rate for conventional septic systems that have no other BMPs, since other BMPs include a requirement for routine septic tank pumping. For any given system, this 5% credit should not be given more frequently than every 5 years, even though more frequent pumping for some systems may be appropriate for other reasons. Verification principles and guidance for advanced on-site treatment systems also apply to septic pumping BMPs. Septic pumping should be performed by licensed service providers. Reported septic pumping events should be tracked and documented by the state or local authorities.

Table B-14. Summary of recommended verification guidance for wastewater treatment facilities, CSOs and on-site treatment systems

	Significant Wastewater Treatment Facilities	***Non-Significant Wastewater Treatment Facilities***	***Combined Sewer Overflows***	***On-Site BMP Treatment Systems***
Principles and guidance for jurisdictions	Monitoring and monthly reporting of flows and loads via DMRs. In addition, (a) annual loading reports are also submitted where trading or general permit conditions apply to a facility, and; (b) annual WIP reporting also applies**.**	• The existing NPDES DMR will be used to report the load reductions due to non-significant wastewater treatment facilities' BMPs that include upgrades and offsets of new or expanding non-significant facilities. • Track the universe of nutrient- and sediment-contributing non-significant facilities against aggregate wasteload allocations, annually report loads using various mechanisms including those described in the jurisdictions' WIPs and document any allocation redistribution or changes in reporting structure that result from trading, offsetting or assimilation by other facilities.	• Construction Verification: properly designed, installed, and maintained by the certified service providers. • Post construction monitoring and Inspection. • Existing compliance and enforcement procedures. • Tracking and reporting	Verification of advanced on-site treatment systems will ensure proper installation and continued operation and maintenance of the systems. Specific requirements (e.g., inspection or sampling frequency) will be based on existing state regulations or will follow the below set of minimum elements for verification based on existing state programs in Delaware (DE), Maryland (MD) and Virginia (VA). • State or local authorities will verify, track and report proper installation and O&M of on-site BMP systems. • The design and installation on-site BMP systems will be done and reported by certified service providers and verified in the permitting processes. • The maintenance and inspection of on-site BMP systems will be conducted and reported annually by certified providers and tracked by the authorities. For some technologies, state or local authorities may stipulate an inspection frequency that is less than annual. The OWTS Expert Panel recommended the O&M inspection frequencies by practice, summarized in Table B-13. Upon approval from the WWTWG and WQGIT, the final recommended inspection frequency may be adopted by the states. • Tracking and reporting through the databases managed by state agencies.
Applicable jurisdictions	All seven jurisdictions	All seven jurisdictions	All seven jurisdictions	DE, MD, VA and WV
How to apply the principles and guidance	Use existing NPDES DMR and state-defined procedures	Use existing NPDES DMR and state-defined procedures	Use the existing CSO regulatory process	• DE, MD, VA and WV agreed to verify on-site BMP systems. PA and NY do not currently plan to seek credit for on-site BMP systems so do not have plans for verification. • Use existing state regulations for on-site treatment systems. • The expert panel recommended septic BMP inspection frequencies, but inspection frequency may vary by technology and state.

Wastewater APPENDIX A

Summary of Delaware's regulatory program for onsite systems

Delaware has language in the on-site regulations allowing guidelines to be developed for Innovative/Alternative (I/A) systems by the Delaware Department of Natural Resources & Environmental Control (DNREC) that permittees must follow. Because of this language, the Department developed Operation and Maintenance (O&M) Guidelines for all I/A systems permitted after February 1st, 2007 (attached). Onsite BMP systems are part of the I/A system category. This guideline has been incorporated into DE regulation update that became effective January 11, 2014.

Systems permitted and installed prior to Feb 1st, 2007 do not have to follow the O&M requirement and are inspected by the Department every three years. This is tracked by an Access database at DNREC.

Systems permitted after Feb 1st 2007 fall under the O&M guidelines. BMP systems are inspected every 6 months by the service provider. Tracking of systems with O&M requirements is also done through an Access database.

All Innovative/Alternative Onsite systems are inspected by the Department and system designer when installation is complete and before the system has been covered and backfilled. A "Certificate of Satisfactory Completion" (COC) is not granted until: the installation has been found to be satisfactory by the Department and system designer (a DNREC licensed PE), a service contract for a minimum for two years has been submitted for the system, the manufacturer representative submits in writing, if not present at the time of inspection, that the installation has been performed correctly. A system cannot be put into use until a COC has been issued. The construction phase of all I/A system is tracked with a database accessible by the Ground Water Discharge Section.

Innovative and Alternative On-Site Wastewater Treatment and Disposal Systems

Operation & Maintenance

Guideline issued February 1, 2007; amended to 7 Del. C., Chapter 60, January 11, 2014

Applicability:

For all Innovative and Alternative On-Site Wastewater Treatment and Disposal Systems ≤ 2,500 gallons per day.

Overview:

Innovative and Alternative (IA) on-site wastewater treatment and disposal systems are classified as anything other than conventional systems. These systems include but are not limited to advanced treatment units, peat biofilters, drip dispersal or a combination thereof. In order to ensure the proper operation and maintenance of IA systems, DNREC requires the permittee, through permit conditions and Regulation, to maintain service contracts with certified service providers for the life of the system.

Definition:

For the purpose of this guideline, a **certified service provider** shall be defined as the following:

1. An individual representative of a manufacturer/supplier who holds a DNREC Class E System Contractor or Class H System Inspector license; or,

2. A Class E System Contractor who is certified, through DNREC approved training, on the operation and maintenance of the advanced treatment unit or system; or,

3. A Class H System Inspector who has become certified through DNREC approved training on the operation and maintenance of the advanced treatment unit or system; or,

4. A Homeowner who has obtained DNREC individual homeowner service provider certification and has been certified through DNREC approved training on the operation and maintenance of the advanced treatment unit or system. The DNREC homeowner certification allows the homeowner to operate and maintain their IA system at their primary place of residence only.

Operation and Maintenance with Permit Conditions

1. Prior to the Ground Water Discharges Section (GWDS) of DNREC granting a Certificate of Completion, the permittee must enter into a service contract with a certified service provider initially, for a minimum of two (2) years starting at the onset of initial system operation. Specifically the service contract shall prescribe an Inspection Program and Homeowner Training Program as outlined below:

5.5.5 The Department may impose specific operation and maintenance requirements for on-site wastewater treatment and disposal systems to assure continuity of performance. All innovative/alternative systems have operation and maintenance requirements. These requirements follow;

5.5.5.1 For new construction, **prior to the Department granting a Certificate of Completion, the permittee, unless certified by the homeowner training program, must enter into a service contract with a certified service provider initially, for a minimum of two (2) years starting at the onset of initial system operation.** For replacement systems, this service contract must be submitted with the permit application. Specifically, the service contract shall prescribe an Inspection Program and Homeowner Training Program as outlined below:

5.5.5.1.1 Inspection Program

The inspection program shall include the following: a schedule indicating inspection frequency, inspection objective(s), inspection details, necessary operation and maintenance activities, additional sampling if required, and record keeping requirements.

5.5.5.1.1.1 Inspection Frequency/Objective: The service contract must outline that the certified service provider is to inspect the system once every six (6) months or otherwise as approved by the Department.

5.5.5.1.1.2 Inspection Reports: The contract must outline that the certified service provider must document all inspections. Operation

inspection reports shall indicate the following: date and time of the inspection, sampling and laboratory analysis results, operation and maintenance performed, repairs, an assessment indicating the current performance status of the entire treatment and disposal system, and any corrective actions that must be taken prior to the next inspection. All inspection reports shall be on forms approved by the Department.

5.5.5.1.2 Homeowner Training Program

The service contract must state that the certified service provider is required to meet with the homeowner during the first sixth month inspection. The certified service provider is to educate the homeowner on the components of the system and on the proper operation and maintenance requirements. At this time, the certified service provider shall provide the homeowner with an operation and maintenance manual.

5.5.5.2 Following the initial two (2) year period, the permittee is required to maintain a service contract for the system by: renewing the existing contract annually, at a minimum, contracting with another certified service provider or being certified by the homeowner training program. The service contract must contain the inspection program requirements from Section 5.5.5.1.1.

5.5.5.3 All reports and contract renewals from the previous year shall be submitted by February 1st of each year to the Department. The certified service provider must submit all inspection reports to the Department and permittee. The permittee shall submit any contract renewals as necessary to the Department.

5.5.5.4 The Department reserves the right to collect and analyze samples to ensure proper treatment levels and system performance.

5.5.5.5 The Department may increase inspection frequencies as warranted. A notice outlining new frequencies and cause will be provided to the permittee prior to initiation.

5.5.5.6 Transferability

Within 90 days after the transfer of the real property which utilizes an innovative/alternative system, the owner shall notify the Department. Transfer of the maintenance agreement must also be completed within this 90 day period.

5.5.6 Innovative/Alternative systems without permit conditions requiring a certified service provider shall be inspected by the Department or its designee once every three (3) years and a fee may be required.

All BMP conventional systems such as shallow pressure dosed systems and Elevated Sand mounds have construction inspections inspected system designer when installation is complete and before the system has been covered and backfilled. A "Certificate of Satisfactory Completion" (COC) is not granted until: the installation has been found to be satisfactory by the Department and system designer (a DNREC licensed PE).

<u>Operation and Maintenance for conventional systems:</u>

5.5 Operation and Maintenance

5.5.1 The owner shall be responsible for operating and maintaining their on-site wastewater treatment and disposal systems.

5.5.2 Each on-site wastewater treatment and disposal system shall be pumped by a licensed Class F liquid waste hauler once every three (3) years and innovative/alternative treatment systems shall be pumped according to manufacturer recommendations unless determined that the tank is less than one-third ($^1/_3$) full of solids. The schedule shall be prescribed in accordance with current Department guidelines based on the size of the treatment unit and anticipated number of residents. The owner of the on-site wastewater treatment and disposal system shall maintain a record indicating the system has been pumped and provide such documentation to the Department upon request.

5.5.2.1 Effluent filters shall be cleaned as per manufacturer's recommendations, at a minimum, or as necessary to prevent backing up into the dwelling. Cleaning is accomplished by hosing off the filter over the open inlet cover riser.

5.5.3 Grease traps shall be cleaned when 75% of the grease retention capacity has been reached.

5.5.4 The sites of the initial and replacement absorption facilities shall not be covered by asphalt or concrete or subject to vehicular traffic or other activity which would adversely affect the soils. These sites shall be maintained so that they are free from encroachments by accessory buildings and additions to the main building.

5.5.4.1 There shall be no lawn irrigating systems installed over the absorption facility when the absorption facility is active.

Inspections for sale of a property using on-site wastewater treatment and disposal systems:

5.4.6.3 Class H

5.4.6.3.1 For all properties utilizing an OWTDS that are sold or otherwise transferred to other ownership, the persons must have the system pumped out and inspected by a Class F and Class H licensee, respectively, prior to the completion of sale. An extension will be given to sheriff sales, short sales, cash sales and auctions for a period not to exceed 90 days from date of sale. All inspections of on-site wastewater treatment and disposal systems shall be submitted to the Department on forms approved by the Department (see Exhibit A). These forms shall be submitted within 72 hours of inspection completion.

5.4.6.3.2 Must be performed by a Class H system inspector.

NOTE: If an inspection has occurred within the previous 36 months and the property owner can provide documentation of such pump out and inspection, then such documentation will fulfill the requirements of 5.4.6.3.

5.4.6.3.3 For transfers of new property, the certificate of completion will fulfill the requirements of this section if issued within the previous 24 months.

5.4.6.3.4 If the owner of an individual OWTDS provides proof of a licensed operator or has an annual service contract with a certified service provider then such documentation will fulfill the requirements of 5.4.6.3.

Wastewater APPENDIX B

Overview of Maryland's processes and regulation in regards to best available technologies for removal of nitrogen (BAT)

- WWTWG protocol: State or local authorities should verify, track and report proper installation and O&M of on-site BMP systems.
- COMAR 26.04.02.07F. "Within 1 month of the completion of an installation, a person installing a BAT system shall report to the Department, or the Department's designee, in a manner acceptable to the Department, the address and date of completion of the BAT installation and the type of BAT installed."
- WWTWG protocol: The design and installation on-site BMP systems should be done and reported by the certified service providers and verified in the permitting processes.
- COMAR 26.04.02.07E "A person who has completed a course of study approved by the Department for the installation of BAT, and has a certification of qualification for installing BAT systems from the manufacturer, must be present on the property while a BAT unit is installed." The design of the BAT must be approved by MDE."
- WWTWG protocol: The maintenance and inspection of on-site BMP systems should be conducted and reported annually by certified providers and tracked by the authorities. For some low maintenance systems, such as the enhanced conventional systems, the inspection frequency could be lower. The CBP on-site BMP expert panel will recommend the inspection frequency by practice, which will be available in April 2013. Upon approval from the WWTWG, the final recommended inspection frequency may be adopted by the states.

COMAR 26.04.02.07D

D. Operation and Maintenance of BAT Systems.

(8) A BAT system shall be operated by and maintained by a certified service provider.

(2) The owner shall ensure that each BAT system is inspected and has necessary operation and maintenance performed by a certified service provider at a minimum of once per year.

(3) The Department shall maintain a list of certified service providers.

(4) Individuals may become certified upon completion of a course of study on operation and maintenance of BAT systems approved by the Department. The course of study must include instruction on how BAT systems function as well as elements on operation, maintenance, and repair of BAT systems.

(5) Certification as a service provider for BAT systems may be revoked at any time by the Department for violation of these regulations.

(6) The certified service provider shall report on inspection, operation, and maintenance activities to the Department, or the Department's designee, in a manner acceptable to the Department on a yearly basis prior to the yearly anniversary of the date of installation.

(7) The certified service provider must have a certificate of qualification from the manufacturer of the BAT system being serviced.

(8) A property owner may obtain certification as a service provider to maintain the property owner's system, subject to all the requirements of this regulation pertaining to operating and maintaining BAT systems."

- WWTWG protocol: Tracking and reporting through the databases managed by state agencies.

26.04.02.07D (6) "The certified service provider shall report on inspection, operation, and maintenance activities to the Department, or the Department's designee, in a manner acceptable to the Department on a yearly basis prior to the yearly anniversary of the date of installation."

COMAR 26.04.02.07F. "Within 1 month of the completion of an installation, a person installing a BAT system shall report to the Department, or the Department's designee, in a manner acceptable to the Department, the address and date of completion of the BAT installation and the type of BAT installed."

Wastewater APPENDIX C

Summary of Virginia's regulatory program for onsite systems

The onsite program is regulated by two different regulations. The *Sewage Handling and Disposal Regulations* (SHDR), 12 VAC 5-610, and the *Regulations for Alternative Onsite Sewage Systems* (AOSS Regulations), 12 VAC 5-613. The regulations can be found at http://lis.virginia.gov/000/reg/TOC12005.HTM#C0610 and

http://lis.virginia.gov/000/reg/TOC12005.HTM#C0613 respectively.

The SHDR provide the administrative and procedural regulations along with prescriptive design criteria for conventional and some alternative systems. Mechanisms to ensure that systems are designed and constructed properly are found here. Those mechanisms include:

1. Submittal of a construction application with supporting soils work; site layout; verification of horizontal separation to wells, surface waters, shellfish, etc.; supporting calculations; and other pertinent design information.

2. Review of the application by environmental health specialists and, as needed, by staff engineers.

3. Confirmation of installation according to plans through completion statements based on inspections by the design professional.

The AOSS Regulations expand upon the design options for alternative systems using performance standards and require monitoring and operation and maintenance to verify compliance. All onsite BMPs are expected to be alternative systems and would be subject to the requirements of this regulation. For small systems (≤1,000 gpd), the following requirements apply:

1. The procedural requirements of the SHDR apply as described above.

2. An operation and maintenance manual is required.

3. At a minimum all AOSSs must be visited by a licensed operator at least once a year and a report submitted to VDH. Additional operator visits may be needed as described by the O&M manual.

4. Generally Approved treatment units (systems that have gone through 3rd party testing) have an initial sample collected within 180 days of startup and then every 5 years. Sampling is for BOD_5 and, if disinfection is in place, for total residual chlorine (TRC) or fecal coliform.

5. Non-generally Approved treatment units (systems that have not gone through 3rd party testing) have an initial sample collected within 180 days of startup and then semi annually for two years. If the mean of the samples complies with the given effluent limit, then the sampling is reduced to annually. Sample parameters are as in 4 above.

6. The annual inspection frequency is retroactive and applies to all AOSSs in Virginia. The sampling requirement only applies to systems constructed under the new regulation.

For large AOSSs, the requirements increase as the design flow increases. For large AOSSs, the following requirements apply:

1. The procedural requirements of the SHDR apply.
2. An operation and maintenance manual is required.
3. A renewable operating permit is required.
4. Sampling required in accordance with Table B-15 below.
5. Operator attendance in accordance with Table B-16 below for facilities over 1,000 gpd and up to 40,000 gpd.
6. For facilities with design flows >40,000 gpd, the frequency reverts to the same frequency for systems under the VPDES discharging permit program as found in 9 VAC 5-790. http://lis.virginia.gov/cgi-bin/legp604.exe?000+reg+9VAC25-790-300.
7. Reports required by 15th of month.

Table B-15. Sampling and Monitoring for Large AOSSs

PLANT SIZE	>2.0 MGD	>1.0 - to 2.0 MGD	> 100,000 GPD to 1.0 MGD	> 40,000 GPD to 100,000 GPD	>10,000 GPD to 40,000 GPD	>1,000 GPD to 10,000 GPD
Flow	Totalizing, Indicating, & Recording	Totalizing, Indicating, & Recording	Totalizing, Indicating, & Recording	Totalizing, Indicating, & Recording	Measured	Measured or Estimate
BOD_5, TSS	24-HC* 1/day	24-HC 5 days/wk	8-HC 3 days/wk	4-HC 1 day/wk	Grab quarterly	Grab 1/yr
Total Nitrogen	24-HC weekly	24-HC weekly	8-HC monthly	4-HC quarterly	Grab quarterly	Grab 1/yr
TRC, End of Contact Tank**	Grab daily	Grab daily	Grab weekly	Grab weekly	Grab weekly	Grab 1/yr
Fecal Coliform***	Grab weekly	Grab weekly	Grab monthly	Grab monthly	Grab quarterly	Grab 1/yr

*HC – hourly, flow weighted composite samples
**if disinfection required and chlorine used
***if disinfection required and a disinfectant other than chlorine used

Table B-16. Minimum Operator Visit Frequency for AOSSs up to 40,000 GPD

Avg. Daily Flow	Initial Visit	Regular visits following initial visit
≤1,000 GPD	Within 180 calendar days of the issuance of the operation permit	Every 12 months
>1,000 GPD to 10,000 GPD	First week of actual operation	Quarterly
>10,000 GPD to 40,000 GPD	First week of actual operation	Monthly

Therefore, the annual inspections for the small systems will verify that the system is operating according to its intended design and the BMP is functioning as designed. For the larger systems, monitoring will verify compliance with the required effluent limit.

Nitrogen limits became effective December 7, 2013, for all new AOSS construction applications received after that date. For small systems, the requirement is for a 50% reduction in TN as compared to a conventional system. The AOSS Regulations reference approved BMPs as suitable for compliance, but the detail on acceptable BMPs is in development. Larger systems have more stringent TN limits and will utilize end of pipe (prior to application to soil) sampling for TN. Those limits are 20 mg/l TN for systems 10,000 gpd or less and 8 mg/l TN for larger systems. Additional removal through the soil dispersal field and then attenuation rates from the edge of drainfield to edge of stream will effectively reduce the input of TN from large systems to negligible amounts.

Wetlands Verification Guidance

Version: August 11, 2014

I. The need for wetlands BMP verification

Restoration, creation, and enhancement of wetlands provide a range of benefits for wildlife, fish, and other aquatic species. Wetlands also filter nitrogen, phosphorus, and sediment from overland flow, thereby providing quantifiable water quality benefits. As such, wetland restoration and creation are recognized best management practices (BMPs) in the Chesapeake Bay Program's (CBP) Watershed Model. This document provides guidance on verifying wetland projects to ensure their pollutant removal performance is appropriately credited toward watershed jurisdictions' two-year milestone commitments and their Watershed Implementation Plans.

The Wetlands Workgroup was charged with developing principles/guidance for verifying wetland BMP projects in order for such projects to continue receiving nutrient and sediment load reduction credit. Workgroup members first received a background document and were asked to describe their monitoring efforts, what level of project verification would be reasonable given existing resources, and what could be accomplished if more resources were available. Personal solicitation by the Workgroup co-chair was also made to certain practitioners. Responses were received from the Maryland Department of the Environment (MDE), Natural Resources Conservation Service (NRCS), U.S. Fish and Wildlife Service (USFWS), Ducks Unlimited, U.S. Environmental Protection Agency (USEPA), New York State Department of Environmental Conservation, Maryland Department of Natural Resources (MD DNR), the National Association of Home Builders, and U.S. Army Corps of Engineers (USACE).

The draft principles were revised and further developed based on feedback received from the Bay Program partners' BMP Verification Review Panel on December 6, 2012 and the Comparison Matrix of source sector and habitat workgroup BMP verification protocols. The wetland principles were then reformatted and enhanced based on comments received in May 2013 during the Habitat Goal Implementation Team's review and comment process. Based on feedback received from the BMP Verification Review Panel in November 2013 and additional verbal feedback from practitioners in December 2013 and January 2014, the wetlands BMP verification principles were restructured into guidance to support the seven watershed jurisdictions in developing their own jurisdiction-specific protocols for wetland BMP verification.

Wetland restoration, creation, and enhancement projects are primarily driven by financial assistance incentive programs (federal and/or state) or regulatory requirements for mitigation of impacts to existing wetlands.

Financial assistance programs (voluntary)

Implementation of wetland projects is usually conducted through incentives from a variety of federal and state financial assistance programs. Some of these programs may be more focused on water quality benefits while others may be more focused on wildlife habitat conservation. Wetland projects implemented under these programs have differing goals that are very site specific and dependent on what is appropriate for the landowner's situation and objectives.

The major federal financial assistance programs for wetland projects include:

- **Wetland Reserve Easements** (WRE): formerly the Wetlands Reserve Program, to be implemented under the 2014 Farm Bill under the Agricultural Conservation Easement Program): Under WRE, the NRCS provides technical and financial assistance to landowners for voluntary wetland protection, restoration, and enhancement projects on privately owned property. WRE projects require a specific monitoring regime throughout the lifespan of the project, as discussed in more detail in a later section. These projects are either maintained in perpetuity or under a 30-year easement contract depending on the selected enrollment option.

- **Conservation Reserve Program** (CRP): The CRP is administered by the Farm Service Agency (FSA) and is a private lands conservation program. Under the CRP, farmers who enroll in the program agree to take environmentally sensitive land out of agricultural production and plant species that support improvement of environmental health and quality. The contracts for agricultural land enrolled in CRP are 10 to 15 years in length with the long-term goal of re-establishing valuable land cover to assist in water quality improvement, soil erosion prevention, and reduction of wildlife habitat loss. Wetland buffers and wetland restoration are practices included in the CRP.

- **Conservation Reserve Enhancement Program** (CREP): CREP is also administered by the FSA and is a state-federal partnership implemented under the authority of the CRP. As such, the CREP serves a similar purpose and contract length as described for CRP above. Under CREP, high-priority conservation issues identified by state, local, or tribal governments are targeted with incentive payments.

- **Environmental Quality Incentives Program** (EQIP): EQIP is a voluntary program providing technical and financial assistance to agricultural producers for planning and implementing conservation practices. This assistance is administered via contracts with a maximum 10- year term. The purpose of EQIP differs from other financial assistance programs in that it is typically focused on wildlife habitat benefits.

Jurisdictional partners within the watershed provide additional financial assistance incentives for wetland projects in each state. Specific state financial assistance programs are listed below:

- Virginia's Agricultural Cost-Share program provides a 25 percent state tax credit of costs up to $17,500 per year for constructed wetland and wetland restoration BMPs. http://www.dcr.virginia.gov/water_quality/costshar.shtml

- The Maryland Agricultural Water Quality Cost-Share (MACS) Program administered by the Maryland Department of Agriculture provides grants covering up to 87.5 percent of BMP installation costs for various practices implemented on agricultural land, which include wetland restoration BMPs. Wetland restoration projects implemented via the MACS program must be maintained for a minimum of 15 years. http://mda.maryland.gov/resource_conservation/Pages/macs.aspx

Mitigation

Some wetland restoration projects are built to offset, compensate or otherwise mitigate for impacts caused by development elsewhere in the watershed. This includes projects implemented in accordance with the compensatory mitigation regulations under Section 404 of the Clean Water Act, as amended, as well as applicable state wetland mitigation regulations. States reporting wetland acreage gains to the Chesapeake Bay Program are asked to distinguish between wetland increases due to voluntary projects versus those constructed as compensation from regulated losses. Wetland restoration or creation projects implemented for compensatory mitigation do not receive BMP credit.

Department of Army permits include:

- Nationwide Permit (NWP): The NWP provides federal authorization on a nationwide basis for commonly recurring activities that have minimal individual and cumulative adverse impacts to the environment. Many NWPs are suspended in Maryland since they are duplicated by the Maryland State Programmatic General Permit-4 (MDSPGP-4) and some NWPs are retained.

- Individual Permit (IP): The IP applies to large/complex projects exceeding thresholds and conditions of nationwide and general permits. This applies to projects with the potential for more than minimal impacts.

- MSPGP-4: The MSPGP-4 is issued by the USACE Baltimore District, providing federal authorization and expedited permitting for activities with minimal impacts. The majority of projects authorized are verified by MDE without the need for USACE's review of the application.

II. Definitions

Restoration, creation and enhancement

Wetland restoration, creation and enhancement projects, while having differing definitions, will undergo similar verification processes. These projects are defined as follows (STAC, 2008):

- **Created wetlands** - manipulation of the physical, chemical or biological characteristics present to develop a wetland that did not previously exist on an upland or deepwater site; results in a gain of wetland acres.

- **Restored wetlands** - manipulation of the physical, chemical or biological characteristics of a site with the goal of returning natural/historic functions to a former wetland; results in a gain of wetland acres.

- **Enhanced/rehabilitated wetlands** - manipulation of the physical, chemical or biological characteristics of an existing wetland (undisturbed or degraded) site to heighten, intensify, or improve specific function(s) or for a purpose such as water quality improvement, flood water retention, or wildlife habitat; results in gain of wetland function, not acres. The significant difference between rehabilitate and enhance is

rehabilitation usually refers to a site that currently has hydrology degradation, while enhancement is usually more about invasive species control.

Projects authorized under a permitting authority as well as those implemented under WRE are subject to specific monitoring requirements, which constitute a built-in level of verification. When performed, it is generally a review of whether or not the project was built as designed, but it is not performed on a set schedule or for great detail. Vegetation or water levels are not necessarily considered. Any consideration of how the regulatory and compliance process might fit with CBP verification must be discussed with regulatory authorities, and not presumed.

The existing wetland restoration BMP efficiencies for nutrient and sediment removal apply to restoration and creation projects; wetland enhancement projects do not yet have approved BMP efficiencies. However, enhancements are accepted in the model under CAST, and aggregated with "restoration." The same efficiency is used in this case.

Stream restoration (floodplain reconnections)

Some overlap exists with regard to stream restoration projects and wetland projects, specifically in hydrologically reconnecting a stream to its floodplain as part of a stream restoration project. In this scenario, the floodplain reconnection allows overflow from the stream during storm events to spread out onto the floodplain, which may include wetland areas. In addition, these floodplain reconnection projects may increase groundwater levels also influencing floodplain wetlands.

Areas of the floodplain may include existing wetlands, agricultural wetlands or wetlands that have been converted as a result of stream channelization and drainage. In many cases where the floodplain is currently forested, the reconnection to the stream results in a rehabilitation of the wetlands, but not an acreage gain. This particular rehabilitation may be more significant in terms of water quality than some wetland re-establishment projects, because of the potential to receive and treat high levels of nutrient and sediment loadings. Stream restoration including floodplain reconnection where the floodplain is currently in agricultural use may include wetland restoration, which would result in acreage gains and significant increases in function, including water quality functions, base-flow support, flood storage, and fish and wildlife habitat.

Under the stream restoration BMP, a floodplain is defined as follows: "For flood hazard management purposes, floodplains have traditionally been defined as the extent of inundation associated with the 100-year flood, which is a flooding event that has a one-percent probability of being equaled or exceeded in any one year. However, in the context of this document, floodplains are defined as relatively flat areas of land between the stream channel and the valley wall that will receive excess storm flows when the channel capacity is exceeded. Therefore, water access to the floodplain is defined much more frequently than what is typically considered a flooding event." (Schueler and Stack, 2013)

Stream restoration can consist of stabilizing eroded banks with vegetation, raising channel bed grade in incised channels, reintroducing meanders in channelized streams, and complete realignment of a stream channel to circumvent a blockage or provide capacity for current flows. Floodplain reconnection is typically combined with all of these stream restoration activities, except perhaps when only stabilizing eroded banks.

In regard to wetland projects as part of the floodplain reconnection, the following are defined:

- **Stream restoration BMP** – under Protocol 3 of the stream restoration BMP, efficiencies are provided for nutrient and sediment load reductions as a result of floodplain reconnection implemented as part of a stream restoration project (Schueler and Stack, 2013); this includes reconnection to floodplain wetlands.

- **Floodplain reconnection** – Restoring the hydrologic connection between the stream channel and its floodplain to allow overflow from the stream to contact the adjacent floodplain area, including floodplain wetlands. This usually involves one or more of the following: removal of historical spoil levees created by the placement of dredge spoil on stream banks; raising of the channel bed grade on incised stream channels to promote overbank flow; or creation of floodplains within channelized streams when the channel grade cannot be raised.

III. Project design and siting

Project information obtained prior to and immediately after implementation provides a baseline level of data. This baseline information can then be used for comparison against monitoring/inspection data to determine if the project is still in existence and functioning as intended. Enabling this comparison is a key part of verification so that the project can continue receiving credit for nutrient and sediment load reductions. Thus the baseline information needed is discussed here in order to set up the project to succeed and to elucidate what initial information is required to enable comparison to monitoring/inspection data, thus facilitating the verification process.

Pre-construction

A wetland project, if designed properly, will continue to function indefinitely, so it is important to focus on the quality of design as well as the siting of the project. Planning and site selection criteria have a great influence on the success of projects. Projects should be located in areas suitable for wetland creation or restoration and to meet clear project objectives. This includes siting projects at locations capable of supporting suitable hydrology, hydrophytic vegetation, and hydric soils.

Hydrology. Hydrology is the most critical factor in most wetland restoration projects. Hydrology analysis can be simple or complicated. In farm fields that have been ditched and contain hydric soils (which is usually where there are ditches), hydrologic analysis is usually minimal because we know the ditch is there to allow crop production. The typical commodity crops planted in Maryland cannot grow well in areas with wetland hydrology. Ditches were often designed and installed based on rating curves that are based on providing sufficient drainage to allow crop production for corn and soybeans. In many cases, in implementation, the ditches were constructed to larger dimensions than were recommended by the rating curves.

For many wetland projects in agricultural fields, in addition to restoration of baseline hydrology, the water levels are increased somewhat from what it may have been historically. This is done to enhance functions for wildlife habitat, as well as to overcome the limits of effects on drainage of adjacent lands. Usually this involves installing a berm adjacent to or across a ditch to prevent

drainage. A control structure is installed at a specific elevation, which only allows water to drain off the site when that elevation is reached.

Topographic information informs practitioners as to the areal extent of the water surface at the control elevation. In Maryland, maximum water levels in wetlands usually occur in late winter and early spring when precipitation is high and evapotranspiration is low, which is concurrent with the start of the growing season. Unlike with a deep water pond, the shallow water surface of a wetland does not require a large contributing drainage area to maintain ponded conditions into the growing season. In fact, in the humid east climate, precipitation alone can provide sufficient water to create an inundated wetland so long as the water is prevented from draining off the surface. Practitioners therefore can safely assume that the areal extent of the water surface at the control elevation is the minimum wetland acreage that will be achieved. In most cases, the full wetland area is not limited to the areal extent of the water surface, or normal pool, because saturation of the soil extends some distance beyond the extent of the water surface.

Hydric soils. The soils on these sites, in addition to being hydric, typically are silt loams or clay loams. These soils contain sufficient silt and clay content to severely restrict water infiltration and subsequent losses through shallow subsurface flow and groundwater to drainage features. In some cases, sandy soils may be present at the surface, but a clayey horizon exists within a couple feet of the soil surface. Water may also be impounded on these soils by installing a cut-off trench below the berm. The cut-off trench is excavated down to the clayey horizon and filled with a clayey soil to inhibit seepage under the berm.

Success of wetland rehabilitation projects can be slightly more difficult to evaluate because they typically occur in areas that are currently wetlands. However, the same concepts that apply to the examples described above also apply to most wetland rehabilitation: where ditches were installed, they were installed and maintained for a reason – to provide sufficient drainage to support production of food and/or fiber. On heavy soils, they often result in the reduction of surface ponding or the reduction in the duration of surface ponding. This occurs because the drainage features, when in sufficient quantity, significantly reduce the travel time of water moving across the surface, thus reducing the effects of the high precipitation to evapotranspiration ratio in the winter and early growing season.

Thus the keys to site assessment for many wetland rehabilitation projects are the presence of drainage features and hydric soils. Manmade drainage features in hydric soils equals a loss of wetland functions. Mitigation of the drainage features equals rehabilitation of those functions. On heavy soils, the area of influence can be determined by the topography, from which acreage can be easily calculated. On sandy soils, the area of influence is more difficult to determine, because much of the effects may be occurring just below or at the surface. The primary available and legally recognized methods are the groundwater flow equations (e.g. ellipse equation), from which the distance of influence perpendicular to drainage ditches can be calculated. Normally, a combination of groundwater flow equations and site visits to look for changes in surface ponding are used to determine the areal extent of rehabilitation. However, the NRCS and USFWS in cooperation with the Agricultural Research Service, the U.S. Forest Service, and the EPA, are evaluating methods using remote sensing technologies to more accurately determine the area of effect.

For rehabilitation projects where the primary form of rehabilitation is reconnection of a stream to its floodplain, hydraulic models of stream flow (e.g. HEC-RAS) are used in combination with topographic data for design and to determine the area of effect. Validation of the model is conducted through site visits during storm flows for visual confirmation of water movement into the floodplain from the stream.

Field indicators providing evidence of the periodic occurrence of inundation or soil saturation can include (per USACE):

- Standing or flowing water
- Waterlogged soil
- Water marks on trees
- Drift lines (piles of debris oriented in direction of water movement
- Debris lodged in trees
- Thin layers of sediment deposited on leaves or other objects

Presence of hydric indicators can be determined by examining the soil for:

- Predominance of decomposed plant material (e.g. peat, muck)
- Bluish gray or gray in color at 10 to 12 inches below the ground surface
- Dark and dull (brownish black or black) soil and hydrogen sulfide odor
- could be sandy with dark stains or streaks of organic material in the upper layer, which is 3 to 12 inches below the ground surface

Post-construction

Sites should be visited after construction and planting to ensure that the project was completed as designed; that structures (e.g. berms, water control structures) are operating properly; that there is a predominance of native wetland vegetation; and hydrology is as planned. For wetland restoration projects, it will also be noted that the project is on hydric soil. Invasive species should be managed to maintain desired plant species composition and abundance. However, the WWG does believe that presence of certain invasive species (e.g., cattail, Phragmites) should not disqualify a project from receiving credit as a BMP. The installing agency should provide a post-construction certification that the wetland restoration project was installed properly, prior to submitting the project for credit in the state tracking database. Wetland practices reported by the various agencies and organizations are compiled by a state-designated data steward and cross-checked for duplication.

IV. Existing inspection, maintenance, monitoring frameworks

Inspection and maintenance frameworks routinely performed as part of state and federal agricultural financial assistance programs in the Bay watershed should serve as the foundation of

each of the jurisdictions' wetland restoration verification protocols. If a state designs its wetland BMP verification protocols around existing inspection and monitoring frameworks associated with a financial assistance program , then those protocols or procedures are fully consistent with this guidance. Protocols or procedures associated with permits may or may not be consistent with this guidance.

The monitoring requirements for financial assistance programs are possible options for verification and are as follows:

- WRE projects are monitored annually for three years, followed by an ownership review in the fourth year, and then three years of remote sensing review. Onsite monitoring should occur every five years after that. Monitoring may be more frequent if there are violations or if compatible uses of the wetland (e.g. prescribed grazing, habitat management) have been approved. However, many WRE projects occur in existing wetlands and count as rehabilitation, which does not have BMP efficiencies for nutrient and sediment removal.

- CRP/CREP projects are verified for correct installation. Annual monitoring is required for 10% of contracts. A fully implemented project is not subject to further status reviews, but a project that is not successful or has a problem may be monitored for two more years. All of these projects are implemented on private lands where landowners typically inspect the sites a few times throughout the year. Landowners contact NRCS regarding any problems noted during these inspections (e.g., structural failure or invasive species).

- Except for WRE, all other projects implemented under U.S. Department of Agriculture and Maryland Department of Agriculture financial assistance programs would be monitored the same as CRP/CREP projects.

- In West Virginia, verification practices for projects reported by NRCS/FSA fall under spot checking in the NRCS/FSA protocols, while grant funded projects follow guidance similar to those listed in this guidance document.

Monitoring requirements under federal/state permits are as follows:

- Permits issued by USACE require background information as part of the permit application process including: location, waterway, detailed project description, wetland delineation, impacts, baseline data on resource, proposed improvements, concept plans, onsite and aerial photos, description/documentation for net increases in aquatic resources functions and services, maintenance plan, monitoring plan. Projects requiring a Department of the Army authorization may have additional monitoring and maintenance requirements.

- MDE has specific requirements for nontidal wetland creation, restoration, and enhancement projects implemented for mitigation of development and agricultural activities. These requirements include project monitoring for five years, submission of annual monitoring reports, and performance of maintenance activities. The mitigation site must also be protected in perpetuity.

- West Virginia has strict follow up requirements for mitigation projects.

V. Verification guidance

Field assessments are used to identify which projects are still in place and functioning as intended and which ones require preventative or corrective maintenance. In addition, field verification enables local governments to analyze their historical inventory of private and public wetland restoration projects to identify which individual projects present the best opportunities to retrofit for additional sediment and nutrient reduction. The assessment tools used in verification may also be adapted to allow local governments to determine if other wetland restoration objectives (e.g., habitat) are being achieved. States can also use the Wetland BMP Matrix (Figure B-4) to address the 'overlapping' BMP verification guidance on riparian forest buffers, wetlands, shoreline erosion control, and stream restoration that are cross-referenced in other (Agriculture, Urban Stormwater) sets of guidance.

The verification process must be simple, preferably following a short checklist that can be completed with minimal examination. The WWG recommends the following checklist for verifying wetland BMP projects; these criteria match the requirements for onsite monitoring of WRE easements, which has also been accepted by the Corps for monitoring projects authorized through NWP27. On small project sites, verification should take no more than twenty minutes and on larger sites, no longer than one to two hours.

- Estimated acreage of restored, created, or enhanced wetland(s)
- Wetland hydrology
- Predominance of hydrophytic vegetation
- Is vegetation primarily herbaceous, trees, or shrubs
- Presence of wetland wildlife; note species observed
- Water control structures and/or berms or ditch plugs functioning properly (note if repairs are needed)
- Planned buffers being maintained
- Meets plan objectives
- Presence of invasive or non-native plants (if so, briefly note species, density, and acreage covered)
- Measures to address threatened and endangered species functioning are being implemented
- Stability/instability/erosive areas

- Compatible uses, if authorized, being implemented in compliance with management plan (Any authorized uses that remove vegetation, other than maintenance of trails as identified in the plan, will be monitored annually for all years for which they are authorized.)
- Conflicting uses (e.g., ATVs, livestock)
- Encroachment of unauthorized activities (e.g. cropping, roads, unallowed mowing, structures other than those allowed)
- Land ownership changes (if so, has new landowner been provided copy of management plan)
- Document areas of concern, required maintenance, recommendations for enhancement

The WWG feels that it would not be appropriate to consider the project's success or failure in meeting other functional objectives through the BMP process since the verification is about properly crediting the project as a water quality BMP. Wetland projects should not be rejected as water quality BMPs due to a failure to meet standards not related to the water quality objective (i.e. habitat-based objectives).

State oversight of local wetland restoration reporting

The installing agency should submit basic documentation to the appropriate state agency for each individual wetland restoration/creation project installed. Localities should check with their state agency on the specific data to report for individual projects. In addition, it is recommended that the installing agency maintain a project file for each wetland restoration project installed (i.e., construction drawings, as-build survey, digital photos, post construction monitoring, inspection records, and maintenance agreement). This file should be maintained for the lifetime for which the load reduction will be claimed. This information would be used as a basis for comparison to long-term monitoring/verification information per the above checklist to determine if the project is still functioning as designed.

Inspection, maintenance, monitoring

Monitoring is the actual part of verification which can be used to determine if the project is functioning as designed. Field experience has shown that if a wetland project is functioning adequately approximately three years following completion of construction, then it will likely continue to function indefinitely. Therefore, onsite monitoring within the three years following construction is recommended. For any long-term monitoring, use of aerial imagery for remote observations is highly recommended for verification of wetland BMPs; remote observations can indicate encroachment of agricultural activities, clearing, and tree removal. Any issues or concerns with projects implemented on private lands are typically reported by the landowner to the installing agency and addressed as needed.

Most wetland projects are designed to minimize long-term maintenance and, therefore, should remain effective indefinitely. Wetland restoration practices implemented under CRP/CREP have a fifteen year contract; however, in most cases, the wetland continues to exist and function

beyond the contract period. Wetland projects enrolled in WRE must be maintained for the duration of the easement, either 30 years or in perpetuity.

Appropriate Verification Guidance to Follow for Multi-BMP Projects

Tracking, reporting, and verification of wetland projects presents a challenge for the Bay Program partners in that these projects cross various pollutant source sector and habitat restoration and protection groups. Verification for wetlands falls under different sets of guidance developed by the Bay Program partners' workgroups including those for wetland restoration projects, stream restoration projects (as related to floodplain reconnection), the agriculture sector (as a structural BMP), and the urban stormwater sector. In addition, various types of wetlands are covered under different BMPs approved by the Partnership and ongoing/upcoming BMP expert review panels convened by different workgroups.

Urban wet ponds/wetlands are not equivalent to a wetland project implemented in an agricultural setting. Therefore, jurisdictions should verify any urban wet pond/wetland projects following the Urban Stormwater Workgroup's BMP verification guidance. In the case of wetland restoration, creation, and enhancement projects, the jurisdictions should follow the guidance provided in this document by the Wetlands Workgroup.

Any wetland projects that are defined as reconnecting a stream to the floodplain are credited according to the revised stream restoration BMP efficiencies adopted by the Partnership (Schueler and Stack, 2013). Therefore, projects of this nature should be verified for their continued existence and proper functioning by jurisdictions following the Streams Workgroup's stream restoration BMP verification guidance. In cases where floodplain reconnection also involves wetland restoration within the floodplain, the wetland BMP verification guidance should be followed for verifying the wetland portion of the project.

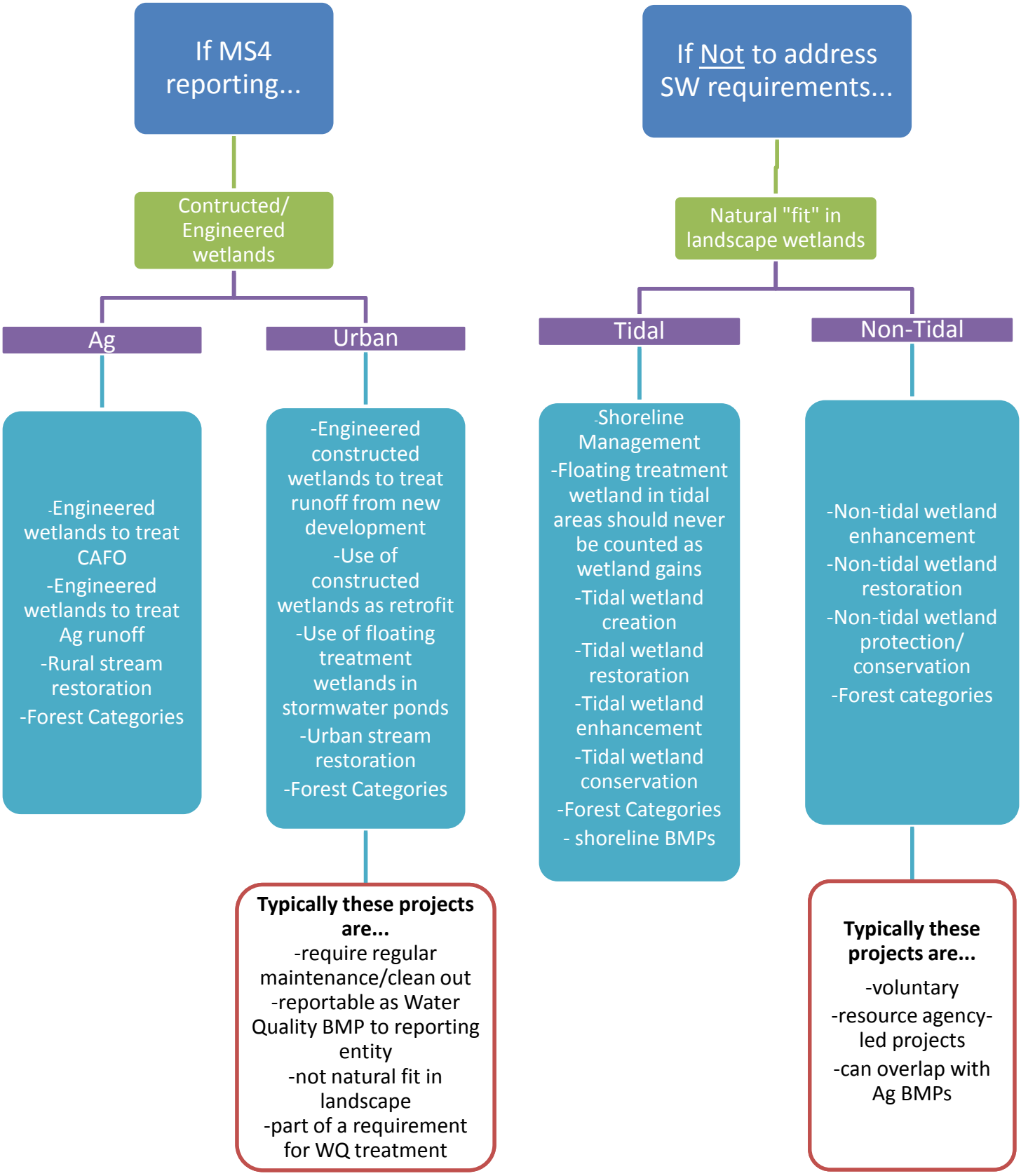
Figure B-4 below provides visual guidance to address the overlapping BMP verification guidance on riparian forest buffers, wetlands, shoreline erosion control, and stream restoration that are cross-referenced in other sets of guidance. This matrix could potentially be used as a reference document by states when addressing verification practices for these BMPs.

References

Chesapeake Bay Program Scientific and Technical Advisory Committee (STAC) (November, 2008). Quantifying the role of wetlands in achieving nutrient and sediment reductions in Chesapeake Bay. *Chesapeake Bay Program STAC Responsive Workshop.* STAC publication 08-006. Retrieved from http://www.chesapeake.org/pubs/238_2008.pdf

Schueler, T. and B. Stack (May, 13, 2013). Recommendations of the Expert Panel to Define Removal Rates for Individual Stream Restoration Projects. http://www.chesapeakebay.net/documents/Final_CBP_Approved_Expert_Panel_Report_on_Stream_Restoration_revised102813_LONG.pdf

Figure B-4. Wetland BMP Matrix



Stream Restoration Verification Guidance

Version: Final, July 16, 2014

The guidance is revised to incorporate comments provided by the Chesapeake Bay Program Verification Review Panel (CBP Water Quality GIT Verification Committee, 2013a and b). Additional changes were not needed following the Panel's April 2014 meeting. Minor edits and clarifications were added in response to feedback on the May 2014 draft BMP Verification Framework document.

Part 1: The Need for Verification

Verification of the initial and long term performance of urban and non-urban stream restoration projects is critical to ensure that nutrient and sediment pollutant load reductions are achieved and sustained across the Chesapeake Bay watershed and provides a means by which state agencies/regulators can also measure functional loss or gain related to these projects. The need for verification is underscored by the estimated 700 miles of planned stream restoration projects by the six Bay watershed states and the District of Columbia in their respective Watershed Implementation Plans and the need to address biological impairments identified as part of local TMDLs across the Bay watershed. While this guidance focuses on individual stream restoration projects, it is recognized that stream restoration is part of watershed-wide efforts to restore the health of the Chesapeake Bay.

The Center for Watershed Protection (Center) in their role as the Chesapeake Bay Program's Sediment Reduction and Stream Corridor Restoration Coordinator, developed guidance with input from the Chesapeake Bay Program (CBP) partners' Habitat Goal Implementation Team (GIT). The guidance is adapted from the 2013 Urban Stormwater Workgroup Memo, *Final Recommended Principles and Protocols for Urban Stormwater BMP Verification* (Goulet and Schueler, 2013) and *Recommendations of the Expert Panel to Define Removal Rates for Individual Stream Restoration Projects* (Schueler and Stack, 2013). Additional guidance for stream restoration projects, specific to riparian wetlands, should also refer to verification guidance on wetlands prepared by the Habitat GIT's Wetlands Workgroup as indicated in Part 4 of this report.

The guidance included in this document is based on the premise that the most important step to assure a project is performing correctly is to first determine that the project is designed correctly and supports clearly articulated goals and objectives. Tools, such as checklists, that standardized information on stream restoration projects may facilitate implementation of this guidance by the Bay jurisdictions. Forthcoming tools as a result of efforts by the Maryland Department of the Environment (MDE) and U.S. Fish and Wildlife Service (USFWS) may provide additional guidance for verification methods that may assist in these efforts.

The Habitat GIT has asked the Center to help coordinate the work of the Stream Health Workgroup (SHWG) with the USFWS, who will be charged with promoting and coordinating the adoption of the Stream Restoration Verification Guidance among the seven Bay watershed jurisdictions.

Part 2: Key Definitions for Stream Restoration Project Verification

The following terms are defined to clarify the application of this guidance to stream restoration project verification.

Stream Restoration Projects*:* Refers to any natural channel design, baseflow channel design, or legacy sediment removal, or other restoration project that meets the qualifying conditions for credits as described in Schueler and Stack (2013), including environmental limitations and stream functional improvements. The types of stream restoration projects are defined as:

1. ***Legacy Sediment Removal*** *(LSR)* - A class of aquatic resource restoration that seeks to remove legacy sediments and restore the natural potential of aquatic resources including a combination of streams, floodplains, and palustrine wetlands.

2. ***Natural Channel Design*** *(NCD*) - Application of fluvial geomorphology to create stable channels that maintain a state of dynamic equilibrium among water, sediment, and vegetation such that the channel does not aggrade or degrade over time. This class of stream restoration utilizes data on current channel morphology, including stream cross section, plan form, pattern, profile, and sediment characteristics for a stream classified according to the Rosgen (1996) classification scheme, but which may be modified to meet the unique constraints of urban streams.

3. ***Wet Channel Regenerative Stormwater Conveyance*** *(RSC)* - Also known as baseflow channel design, these practices can be located in intermittent and ephemeral waters as well as further down the perennial stream network and use instream weirs to spread storm flows across the floodplain at minor increases in the stream stage for events much smaller than the 1.5-year storm event, which has been traditionally been assumed to govern stream geomorphology and channel capacity. Wet channel RSC may also include sand seepage wetlands or other wetland types in the floodplain that increase floodplain connection or interactions with the stream. This description is not what is described in additional MDE guidance: the projects are also constructed in ephemeral and intermittent waters; location in perennial streams may face serious challenges in obtaining permits. The definitions here and verification should not be setting design or siting criteria.

Legacy Stream Restoration Projects*:* Refers to the population of stream restoration projects in a community that the state has reported to EPA for inclusion into any past version of the CBWM for sediment or nutrient reduction credit.

Non-Conforming Stream Restoration Project*:* Projects that do not conform to the reporting requirements of the stream restoration protocols outlined in Schueler and Stack (2013) and instead receive credit using the interim rate.

Part 3: Background on Verification of Stream Restoration Projects

Stream restoration projects are subject to a series of permits, including National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) permits, U.S. Army Corps of Engineers permits, and state-specific permits. These permits are summarized in Table B-17. Each permit may have requirements for monitoring and reporting. However, the current post construction and maintenance inspections are not oriented toward

verifying the actual pollutant removal performance of the stream restoration projects. Instead, local inspections primarily focus on whether the project was installed per design, and that its future condition will not cause harm to public safety and/or cause nuisance problems in the community. For verification purposes related to the Chesapeake Bay TMDL requirements, the development of inspection guidelines that utilize visual indicators is highly recommended to verify that the performance of the project is adequate to still achieve the intended nutrient and sediment pollutant load removal rate.

Table B-17. Permits Required for Stream Restoration Projects

Permit	Description
All States	
Nationwide Permits (NWPs)	Nationwide permits are general permits implemented by the U.S. Army Corps of Engineers (ACE) for commonly recurring activities that have minimal individual and cumulative adverse impacts to the environment. Most NWPs have been suspended in Maryland and Pennsylvania since they are duplicated by State Programmatic General Permits already in place. However, NWP 27 (Aquatic Habitat Restoration, Establishment, & Enhancement Activities) is still in place and states that activities must result in net increase in aquatic resource functions and services over the existing conditions.
State Programmatic General Permits (SPGPs)	SPGSs authorize work in Waters of the United States within individual states for activities that would cause no more than minimal adverse environmental effects. They are administered by the U.S. Army Corps of Engineers in conjunction with state agencies. Within individual states there are specific enforcement thresholds on the size of the area impacted that are included under the general permits. In most cases, projects authorized by the state agencies do not need ACE review of the application.
Individual Permits (IPs)	Individual permits, also known as a standard permits, are implemented by the ACEand are generally reserved for projects with potential for substantial environmental impacts. An individual permit (IP) requires a full public interest review, including public notices and coordination with involved agencies, interested parties and the general public. IPs involve large/complex projects exceeding thresholds and conditions of nationwide and state general permits (highways on new alignment, subdivisions, dredging).
NPDES MS4 Permits	Phase 1 and Phase 2 communities have NPDES MS4 permit conditions which require them to have programs and staff in place to ensure that maintenance inspections are done according to a prescribed cycle. The frequency of maintenance inspections ranges from 3 to 5 years, depending on the permit status of the jurisdiction. In addition, most MS4 communities have an annual BMP reporting requirement, and often provide aggregate information to the state on the number and type of BMPs that are installed during the reporting period.
State-Specific	
Virginia Marine	The subaqueous permit program enforced by the Virginia Marine

Permit	Description
Resources Commission Subaqueous Permit	Resources Commission applies to activities impacting perennial streams with drainage areas that exceed 5 mi^2 or with a mean annual instream flow of 5 cubic feet per second. A joint local/state/federal permit application is required and is subject to a public interest review. The permit may include restrictions on the time of year for construction activities and specific construction methodologies. Monitoring reports are required every year for 5 years, the 7^{th} and 10^{th} years, and every year thereafter until the project is demonstrated to be stable for 2 successive years.
Virginia Water Protection (VWP) Permits	The Virginia Water Protection (VWP) permit program is administered by the Virginia Department of Environmental Quality's Office of Wetland and Stream Protection and involves the regulation of water withdrawal projects, excavation, filling, or activities that affect the biological, chemical or physical properties of surface waters (including streams, lakes and wetlands). Generally, activities requiring a permit include dredging, filling, or discharging any pollutant into or adjacent to surface waters, or otherwise altering the physical, chemical or biological properties of surface waters. The VWP general permits include separate permits for impacts less than ½ acre, utility projects, linear transportation projects, and development activities. A joint local/state/federal permit application is required.

The *Final Recommended Principles and Protocols for Urban Stormwater BMP Verification* (Goulet and Schueler, 2013) documents several challenges that still need to be addressed to develop an effective verification system for urban stormwater BMPs in the Chesapeake Bay watershed. Most of these challenges also apply to stream restoration projects. This guidance identifies additional challenges specific to stream restoration projects.

- There are a variety of stream restoration techniques, such as natural channel design, RSC/baseflow channel design and valley/floodplain restoration, which regulators may not necessarily have experience reviewing. Additional challenges arise when the design for a particular site may not meet regulatory requirements and will adversely affect other resource benefits.

- Stream restoration projects often do not follow a consistent design process where the project's goals and objectives are established through an analysis of the restoration potential which in turn is determined through a systematic assessment of stream functions.

- Post construction monitoring is typically required to satisfy permits. The duration can vary depending on the complexity of the project and is often between 3 to 5 years. However, stream restoration projects are subject to catastrophic damage from extreme flood events. To ensure that the projects still exist and are operating as designed, monitoring is needed on an indefinite basis. The Stream Restoration Expert Panel recommended the maximum duration for removal credits as 5 years, with indefinite renewal of the credit pending field performance inspections.

Part 4. Guidance for Verifying Stream Restoration Projects

The following guidance is recommended to verify stream restoration projects are implemented and operating correctly in each of the seven Chesapeake Bay watershed jurisdictions.

1. *Methods to Verify Individual Stream Restoration Projects.* The level of detail needed for verification will be based on the type of project (natural channel design, baseflow channel design, and removal of legacy sediments), as well as the size, complexity, and landscape position of the proposed project. It is important that the method used to verify stream restoration projects identifies key features that relate to stream function and project goals and objectives. The USFWS and EPA have developed a function-based framework for stream restoration projects and is presented in the "*A Function-Based Framework for Stream Assessment and Restoration Projects*." (http://www.fws.gov/chesapeakebay/stream/protocols.html, http://water.epa.gov/lawsregs/guidance/wetlands/upload/12-natural_channel_design.pdf) This framework provides an excellent example of how the assessment, design and project goals can be an integral part of the verification process. The USFWS has also developed the *Function-based Stream Restoration Project Process* that illustrates how the framework can be applied to stream restoration projects (http://www.fws.gov/chesapeakebay/stream/demoprojects.html). Using the framework will greatly benefit non-conforming projects that use the interim rate for estimating nutrient and sediment load reduction. These projects may lack the detail necessary to use the protocols developed by the expert panel, however, a post construction checklist can establish a baseline that can verify that the project is meeting minimum performance standards to warrant the interim rate reductions.

2. *Maintenance and Monitoring tied to Performance.* Regular inspections and maintenance of stream restoration projects are critical to ensure their benefits in preventing sediment and nutrient pollution are maintained and extended over time, as well as to maintain other local design objectives (e.g., habitat improvement, channel stability, and landscape amenity). Therefore, the verification process should ensure that stream restoration projects are installed and maintained properly over their design life to qualify for their sediment and nutrient reduction credits. This will require verification protocols to define: (1) the frequency for field verification of stream restoration practices; and (2) the process for downgrades if maintenance is not performed. All qualifying projects must have a designated authority responsible for development of a project maintenance program that includes routine maintenance and long-term repairs. Monitoring is the actual part of verification which can be used to determine if the project is functioning as designed. If it is not functioning as designed, then the monitoring data may be used to identify factors responsible such as improper construction or the need for maintenance. The USWS is in the process of developing a *Rapid Function-based Stream Restoration Monitoring Protocol* that will be available in April 2014 and can be obtained at http://www.fws.gov/chesapeakebay/stream/protocols.html.

3. *Utilize Existing Maintenance and Monitoring Inspection Frameworks.* The existing MS4 inspection and maintenance framework and local sediment control regulations for hundreds of communities in the Chesapeake Bay watershed should be the foundation of any stream restoration verification system. Use of the existing 404 Permit/401 Certification inspection

framework may also have potential, but requires concurrence and support from pertinent agencies. Routine maintenance data collected under these frameworks will ultimately inform the verification process described in #8 below. In addition, maintenance and inspection requirements included in state and federal agricultural cost-share programs should be incorporated into verification of non-urban stream restoration projects. Many of the monitoring and inspection requirements under Nationwide 27 and local permits are limited to 3 - 10 years. It is therefore important for the installing agency to continue inspections throughout the project life. The Habitat GIT will work with the state and federal regulatory agencies to determine if their existing maintenance and inspection programs can be used to support implementation the Chesapeake Bay Program partners' basin-wide BMP verification framework.

4. *Removal Rate Tied to Field-based Measurement Methods that verify stream design criteria*. The verification of nutrient and sediment removal rates using the *Recommendations of the Expert Panel to Define Removal Rates for Individual Stream Restoration Projects* should be based on design criteria that can be field verified using measurement methods. Design criteria should be established after a stream function-based assessment determines what restoration potential (goals and objectives) is achievable. Instructions for how to develop function-based assessment, design criteria and measurement methods can be found in Harman and Starr (2011). The maximum duration for which the stream restoration pollutant removal rate applies is 5 years, which can be renewed based on a field performance inspection that verifies the project still exists, is adequately maintained, and is operating as designed. The protocols being developed by USFWS for MDE may be helpful in defining performance indicators to assess project performance.

5. *Stream Restoration Verification as Adaptive Management.* It is recommended that field assessments provide the information needed to verify which projects are functioning as designed to achieve their defined goals and objectives and those projects that require preventative or corrective maintenance to maintain their function(s). Such assessments may also identify factors contributing to the project's success or failure that may be used to inform changes, as needed to existing designs or future monitoring.

Until recently, post-project monitoring has been rarely conducted to assess how well stream restoration projects meet their intended design objectives over time. Real world data collected on actual stream restoration performance enables local and state agencies to improve the next generation of projects in an adaptive management process. This process can isolate the specific site conditions, design features and maintenance tasks that influence stream restoration longevity and performance, and incorporate these into improved design specifications, review and inspection procedures and maintenance requirements. It is recommended that future stream restoration expert panels would review such data to determine if these improved projects would qualify for a higher removal rate, and refine restoration methods and practices that ultimately ensure greater project success.

Bay jurisdictions are encouraged to keep informed of the development of guidance and tools that may assist in these efforts. For example, workshop findings from an upcoming STAC workshop *Designing Sustainable Stream Restoration Projects within the Chesapeake Bay Watershed* may help to identify methods to evaluate projects, in addition to the guidelines for a detailed function-based stream assessment method, a rapid function-based stream assessment method, and a stream

restoration design review method under development by Maryland Department of the Environment (MDE) and U.S. Fish and Wildlife Service (USFWS), along with input from stream restoration professionals.

6. *Stream Restoration Reporting Must be Consistent with Bay Program Approved Practices and Definitions.* Each state has a unique system to report stream restoration projects as part of their MS4 and 404/401 permits. In some cases, states are still developing and refining their reporting systems. Consequently, it may not be possible or even desirable to implement a basin-wide stream restoration reporting format. However, to get credit in the implementation of nutrient and sediment pollutant load reducing practices, stream restoration implementation data using Bay Program-approved rates or methods, reporting units and geographic location (consistent with NEIEN standards), and periodically updated data based on the local verification of projects in the field is needed. The Habitat GIT will initiate discussions with regulatory agencies to determine how their operations may support this data reporting, with a goal of not increasing the burden on regulatory agencies.

7. *Initial Verification of Stream Restoration Installation.* The installing agency will need to provide a post-construction certification that the stream restoration project was installed properly, meets or exceeds its functional restoration objectives, and is hydraulically and vegetatively stable, prior to submitting the project for credit in the state tracking database. This includes non-conforming projects as well. To receive sediment and nutrient reduction credit for stream restoration projects that involve the restoration of riparian wetlands, the installing agency will need to verify that the riparian area associated with the project meets the state's legal definition of a wetland (e.g., hydrophytic vegetation, hydric soils) as well as the guidance for wetland verification (Habitat GIT, 2014)

8. *Recommended Cycle for Field Verification of Stream Restoration Projects.* The installing agency needs to conduct inspections two years after initial construction, as this is the most critical period, especially for assurance that vegetative practices are surviving. After this initial three year period, the frequency of inspections should be once every 5 years to ensure that individual projects are still capable of removing nutrients and sediments. The installing agency should consider more frequent inspections after large flood producing storms as defined by local or state agencies. The routine maintenance and inspection frameworks referenced in #3 are a critical component to assure that stream restoration projects are functioning between the verification periods.

9. *Suggested Process for Stream Restoration Project Downgrades.* If a field inspection indicates that a project is not performing to its original design criteria, the locality would have up to one year to take corrective maintenance or rehabilitation actions to bring it back into compliance. If a project is not fixed after one year, the pollutant reduction rate for the project would be eliminated, and the locality would report this to the state in its annual MS4 report. Non-permitted municipalities would be expected to submit annual progress reports. The load reduction can be renewed, however, if evidence is provided that corrective maintenance actions have restored its performance.

10. *Special Procedures for Stream Restoration Projects Used for Offsets, Mitigation and Trading.* Some stream restoration projects are built to offset, compensate or otherwise mitigate for impacts caused by development elsewhere in the watershed. In other cases,

stream restoration projects may be built for purposes of trading nutrient credits within a community or a state. Special procedures need to be developed in both cases to prevent double counting of practices.

11. *State Oversight of Local Stream Restoration Reporting.* The installing agency must submit basic documentation to the appropriate state agency to document the nutrient and sediment reduction claimed for each individual stream restoration project installed. Localities should check with their state agency on the specific data to report for individual projects. Some typical reporting information includes:

    a. Type, length and width of stream restoration project

    b. Location coordinates

    c. Year of installation and maximum duration of credit

    d. 12 digit watershed in which it is located

    e. Protocol(s) used

    f. Projected sediment, nitrogen, and phosphorus load reduction

For non-conforming projects that use the interim rate to estimate nutrient and sediment load reduction, only a – d would apply. Projects that involve the restoration of riparian wetlands will need to provide basic information, such as wetland area and drainage area and will also need to address guidance for riparian wetlands as developed by the Habitat GIT. In addition, the installing agency should maintain an extensive project file for each stream restoration project installed (i.e., construction drawings, as-build survey, credit calculations, digital photos, post construction monitoring, inspection records, and maintenance agreement). The file should be maintained for the lifetime for which the load reduction will be claimed.

To provide accountability, Bay states will be asked to use their existing MS4 regulatory authority that could include periodic field inspections review of local maintenance inspection records, to verify performance of local stream restoration practices. The state oversight process should be transparent and publicly accessible so that NGOs, watershed groups, and other stakeholders can be confident that BMP implementation is real.

12. *EPA Review of State Verification Oversight.* So as to not create an additional regulatory burden, the Habitat GIT will discuss with EPA Region 3 the feasibility of using its existing NPDES MS4 permit review process to provide periodic reviews the implementation of state BMP verification protocols to ensure they are being effectively implemented.

13. *Review and Verification of Bay Program partners' BMP Accounting.* The accounting methods and verification procedures used by the Bay Program for stream restoration projects must be clear and transparent so that local governments and the states can readily understand how the projects they report are being used to calculate pollutant reductions in the Chesapeake Bay Watershed Model. Better communication among the Bay Program and

its state and local government partners will help to improve BMP reporting and ensure a fair representation of state and local program implementation.

References:

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Appendix C. BMP Verification Review Panel Charge and Members

The Chesapeake Bay Program convened the BMP Verification Review Panel in September 2012 to provide an independent perspective and expert evaluation of both the components of the basinwide verification framework as they were being developed as well as the jurisdictions' proposed enhanced verification programs. There were no examples to follow in terms of a comprehensive BMP verification program extending across a large, multi-state watershed, addressing a multitude of source sectors all at the same time. Therefore, the Bay Program Partners sought the expertise and advice of recognized experts in related disciplines. The Panel brought to the Bay Program a diversity of experiences and expertise, drawn from programs, institutions, and agencies around the Chesapeake Bay watershed and across the country.

Review Panel Charge

The BMP Verification Committee drafted and the Management Board approved a charge to the Panel which addressed two major objectives:

- Providing advice, feedback, and recommendations to the Chesapeake Bay Program partnership as it develops its basinwide verification framework; and

- Using the verification principles as criteria for assessing the strengths and any possible vulnerabilities in the state verification programs and providing written feedback and recommendations on each jurisdiction's program.

The approved Panel's charge is provided in Table C-1. The charge to the Panel also asked that the Panel review and provide feedback on and recommendations for changes to the draft set of BMP verification principles. Further, the charge requested that individual panel members work directly with the appropriate source sector/habitat restoration workgroups, providing advice, feedback, and recommendations during the respective workgroup's development of verification guidance specific to their pollutant source sector/habitat. Finally, the Bay Program charged the Panel with evaluating whether the level of verification rigor is consistent across source sectors and across all seven watershed jurisdictions. Beyond its established charge, the Verification Review Panel agreed that its members will be available for further consultation with the states as they develop and document their enhanced verification programs.

Table C-1. BMP Verification Review Panel charge

Approved September 13, 2012
by CBP Management Board

Overview

The Chesapeake Bay Program partnership has embarked on a precedent-setting process for developing a basinwide BMP verification framework supporting state specific BMP verification programs. In addition to partnership adoption of a set of verification principles and development of sector focused verification protocols, an independent panel of national and regional verification experts will be established. The BMP Verification Review Panel will provide advice, feedback, and recommendations to the Chesapeake Bay Program

partnership as it develops a BMP Verification Program for confirming nutrient and sediment reductions from the full array of best management practices and technologies implemented across all sources (agriculture, urban, on-site treatment systems, wastewater dischargers, etc.) in the Chesapeake Bay Watershed.

Charge

The BMP Verification Review Panel (the Panel) will provide advice, feedback, and recommendations to the Chesapeake Bay Program partnership as it develops its Verification Program.

The Panel will review and provide feedback on and recommendations for changes to the draft set of BMP verification principles.

Individual panel members will work directly with the appropriate source sector/habitat restoration workgroups, providing advice, feedback, and recommendations during the respective workgroup's development of verification protocol specific to their sector/habitat.

The Panel will use the verification principles as criteria for assessing the strengths and any possible vulnerabilities in the state verification programs, providing written feedback and recommendations to the Chesapeake Bay Program's BMP Verification Committee on each jurisdiction's program.

The Panel will also evaluate whether the level of verification rigor is consistent across source sectors and across all seven watershed jurisdictions.

Membership

The Panel will be comprised of recognized national and regional verification, certification, and mitigation tracking experts who are independent of the Chesapeake Bay Program partnership.

The panel as a whole will include expertise and proficiencies in as many of the following areas as possible:

- Applied knowledge and experience in developing and managing verification programs.
- Applied knowledge and experience in balancing verification needs with resource/staff needs.
- Knowledge of variety of verification tools (on-the-ground data collection, verification techniques, statistical techniques, survey techniques, etc.) available and their utility and application for verifying practices across a multitude of sources.
- Expertise in the social sciences with regard to understanding how to best structure surveys and other mechanisms for gathering data and verifying actions taken.
- Knowledge of water quality-related nutrient and sediment reduction practices and innovative technologies within various source sectors (agriculture, urban, on-site systems, wastewater, etc.).
- Knowledge of the Chesapeake Bay Program, TMDLs, and concept of reasonable

assurance for nonpoint source nutrient/sediment reductions.
- Knowledge and expertise necessary to really work through the entire verification framework coming forth from the work of the partnership.
- Understanding of how practices and technologies and their effectiveness may vary by geographic region in the watershed.
- Balance of membership from government, academic, programmatic, private sector, etc.

Specific members are sought from the following types of members, but there is no requirement for ensuring all of these potential members are included on the panel:
- Members with specific source sector experience in agriculture, stormwater, and on-site treatment systems.
- Member from the prior National Academy of Science/National Research Council's Chesapeake Bay Independent Evaluation Committee (see separate file listing the Committee members).
- Member(s) with recognized national perspective and can provide a larger view than just a regional and local focus.
- Member with from a local government with well recognized hands-on experience with verification at the locality scale.
- Member with demonstrated habitat restoration and mitigation program verification related experience.
- Private sector member with ISO 9000/14000 experience.
- Member with LEED/Green Building Council experience with verification procedures.
- Member(s) from the Chesapeake Bay Commission's Economics of Nutrient Trading Study Advisory Council members (see separate file listing Advisory Council members).
- Members with recognized regional/local expertise so the members come to the table already knowing the Bay watershed states, the issues, and the challenges being faced.

All panelists will be asked to identify any potential financial or other conflicts of interest prior to serving on the Panel. The Panel will have an equitable representation of experts, affiliations, and source sector and geographic knowledge. These conditions will ensure the Panel is not biased toward particular interests or regions.

The Panel may elect to solicit input or presentations from groups that may not qualify as panel participants but may provide valuable insights into the verification issue that will help with its review.

Review Panel Membership

In convening the Panel, the Bay Program sought a membership that would be comprised of recognized regional and national verification, certification, and mitigation tracking experts who were independent of the Chesapeake Bay Program. The BMP Verification Committee outlined a series of desired expertise and proficiencies which would be reflected in the Panel membership (Table C-1). Examples included applied knowledge and experience in developing and managing

verification programs as well as knowledge of the variety of verification tools available (e.g., on-the-ground data collection, verification techniques, statistical techniques, survey techniques, etc.) and their utility and application for verifying practices across a multitude of source sectors and habitats.

The Bay Program was looking for a balance of Panel membership from government, academia, non-governmental organizations, and the private sector. Towards this objective, the BMP Verification Committee included a specific request for proposed members which included a detailed listing of the types of members being sought as part of its widely distributed call for panel members (Table C-1). Two specific examples were members were sought with specific source sector experience in agriculture, stormwater, and on-site treatment systems and a member from the prior National Academy of Sciences National Research Council's Chesapeake Bay Independent Evaluation Committee. However, there was no requirement applied for ensuring all of these potential member types were included on the panel.

In making decisions on the Panel members to recommend to the Management Board for final approval, as described below, the BMP Verification Committee sought a Panel membership which would have an equitable representation of experts, affiliations, source sectors, and geographic knowledge. All panelists were asked to identify any potential financial or other conflicts of interest prior to serving on the Panel. These conditions were set up in advance to ensure the Panel was not biased toward particular interests or regions.

Process for Review Panel Membership Selection

At its February 2012 meeting, the Bay Program's Principals' Staff Committee agreed to proceed forward with development of a basinwide BMP verification framework, including convening of a panel of verification experts.[1] That same month, the Bay Program's Management Board decided at its February 9, 2012 meeting that it would be responsible for making decisions on the BMP Verification Review Panel's final membership and charge based on recommendations from the BMP Verification Committee.[2]

Based on the June 21, 2012 call for nominations distributed via email to the Bay Program's Water Quality and Habitat goal implementation teams, their respective workgroups, and the Bay Program's three advisory committees—Citizens, Local Government, and Scientific and Technical, the BMP Verification Committee received a total of 27 nominations for panel members. Committee members then were asked to provide their top five nominees as well as identify any nominee(s) they felt had either a conflict of interest or did not have the expertise being sought for the panel members.

The results from Committee members' voting were compiled and shared with the full Committee membership in advance of its August 16, 2012 conference call.[3] Committee members narrowed down the list of nominees to a set of 13 experts. The Committee had one final review of the narrowed down list through the end of August, with a number of Committee members concurring with the full list for final selection by the Management Board. The Management Board accepted the 13 nominees at its September 13, 2012 meeting, and also approved the BMP

[1] www.chesapeakebay.net/calendar/event/17880/
[2] www.chesapeakebay.net/calendar/event/17872/
[3] www.chesapeakebay.net/calendar/event/18556/

Verification Review Panel's Charge and Operations as recommended by the BMP Verification Committee.[4] The full list of Panel members, their contact information, and short biographies is provided in Table C-2.

[4] www.chesapeakebay.net/calendar/event/18086/

Table C-2. BMP Verification Review Panel members

Name	Affiliation
Rich Batiuk (Coord.)	U.S. EPA, Chesapeake Bay Program Office (CBPO)
Jeremy Hanson (Staff)	Chesapeake Research Consortium, CBPO
Curtis Dell	USDA NRCS & USDA Agricultural Research Service
Mike Gerel	Sustainable Northwest
Tim Gieseke	Ag Resource Strategies
Rebecca Hanmer	Retired Citizens Advisory Committee
Dianna Hogan	U.S. Geological Survey Eastern Geographic Science Center
Richard Klein	Community and Environmental Defense Services
Andrew Sharpley	University of Arkansas
Tom Simpson	Water Stewardship, Inc
Gordon Smith	Wildlife Works Carbon LLC
Rebecca Stack	District of Columbia Department of the Environment (DDOE)
Robert Traver	Villanova University, Department of Civil & Environmental Engineering
Dana York	Green Earth Connection
Dan Zimmerman	Warwick Township

Curtis Dell, Ph.D.
Research Soil Scientist, USDA-ARS-Pasture Systems and Watershed Management Research Unit; USDA-NRCS Science Advisor for the Chesapeake Bay Watershed, and; Adjunct Associate Professor, Ecosystem Science and Management Department, Penn State University.

Curtis Dell received a B.S. in Agronomy (1985) and M.S. in Soil Microbiology (1991) from Purdue University, and a Ph.D. in Soil Microbiology from Kansas State University (1998). After completing his PhD, he spent one year as a Congressional Science Fellow in the office of U.S. Senator Kent Conrad of North Dakota and two years as a post-doctoral Research Associate at Michigan State University. Since 2001, he has been a Research Soil Scientist with the USDAARS at University Park, Pennsylvania. His research has focused on carbon and nitrogen cycling in agricultural soils and the impact of nutrient management on water and air quality. Dr. Dell currently lead projects studying impacts of using various manure application equipment on ammonia and nitrous oxide emissions from soil; soil carbon sequestration and nitrous oxide emissions with switchgrass grown for biofuel feedstocks and in sustainable dairy forage rotations; and utilization of slow release and inhibitor-treated nitrogen fertilizers to reduce nitrogen gas emissions and enhance crop uptake. He is also part of a team researching impacts of various aspects of manure management on water quality. Currently, he is on a special assignment with USDA-NRCS as Science Advisory for the Chesapeake Bay Watershed, where he provides input on the new and modified agricultural conservation practices to

help reduce nutrient inputs into the Bay.

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Mike Gerel
Klamath Program Director, Sustainable Northwest

Mike Gerel leads Sustainable Northwest's work in the Klamath River Basin to help resolve years of high profile water disputes and bring environmental and economic health to a region uniquely rich in biodiversity, agricultural productivity, culture. He has 20 years' experience directing complex water resource science and policy efforts with stops at the Chesapeake Bay Foundation, Sustainable Conservation, the Virginia Department of Conservation, and U.S. EPA contractors.
Mike was integral to the creation of the landmark new plan that will guide restoration of the Chesapeake Bay ecosystem. He is a skilled communicator and strategic thinker with a special knack for finding science-based, collaborative solutions that balance the needs of natural resources and people. Mike has a Masters in Environmental Science & Policy from Johns Hopkins University, Bachelors in Biology from the University of Richmond, is a fellow with the Virginia Natural Resource Leadership Institute, and serves on an U.S. EPA Chesapeake Bay restoration practice verification expert panel. Mike is both an avid outdoorsman and indoorsman, enjoying hiking, biking, independent music, baseball on TV, and trying to keep up with his fiancée Jess and 3-year old lab Moka.

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Tim Gieseke
President, Ag Resource Strategies, LLC

Tim Gieseke is president of Ag Resource Strategies, LLC; a business addressing the challenge of integrating food production and natural resource management to reap the best of both worlds. His current and past efforts include natural resource assessment projects with non-government organizations and local, state and federal agencies. He has developed and implemented environmental quality assurance processes on several hundred farms with support from livestock groups including Minnesota Milk Producers Association, and the Minnesota Department of Agriculture.
He consults with organizations and project such as United Nations Foundation, 25x25, and US Water Alliance on ecosystem service market research and development. For the CRP Readiness Initiative, an effort by NRCS and the University of Wisconsin to expand the conservation delivery system by training local government, NGO and private sector professionals, he develops curriculum and provides training in the Midwest. In 2011, he published *EcoCommerce 101: Adding an ecological dimension to the economy*, a book describing a process for including agro-environmental externalities into the economy.
In the decades prior to beginning his business in 2007, his career included farming, local government conservation, farm bill policy analysis, and he received his master's degree in environmental sciences.

He, his wife and three boys reside on and manage their fourth-generation farm in southern Minnesota.

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Rebecca Hanmer
Retired, Chesapeake Bay Program Citizens Advisory Committee

Rebecca W. Hanmer is a member of the Chesapeake Bay Program's Citizens Advisory Committee. She retired in 2007 after a four decade government career that included over 30 years in the U.S. Environmental Protection Agency. At EPA, she held a number of senior positions, including Director of EPA's Office of Federal Activities; Deputy Regional Administrator in Region I (Boston); Regional Administrator in Region IV (Atlanta); Director, HQ Office of Water Enforcement and Permits; Deputy Assistant Administrator for Water and Acting Assistant Administrator for Water; Acting Regional Administrator in Region VIII (Denver); Water Protection Division Director in Region III (Philadelphia) and Director, Chesapeake Bay Program Office (2002-2007). She has administered Clean Water Act programs at both policy and operational levels, including water quality standards and the NPDES permit program.

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Dianna Hogan, Ph.D.
Research Physical Scientist, Eastern Geographic Science Center, U.S. Geological Survey

Dianna Hogan is a Research Physical Scientist with the U.S. Geological Survey Eastern Geographic Science Center in Reston, Virginia. She has a BS in Biochemistry, a MS in Biology, and a PhD in Environmental Science and Public Policy. Her research focuses on ecosystem services and the environmental effects of land use on natural systems. Current and recent projects include an assessment of the ability of urban stormwater Best Management Practices (BMPs) in the Chesapeake Bay Watershed to mitigate water quality, quantity, and flow; and the development of an ecological value model to support land use decision-making in south Florida.

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Richard Klein
Founder and President, Community & Environmental Defense Services

Richard Klein is the author of *How To Win Land Development Issues* and *Everyone Wins: A Citizens Guide To Development*, which was published by the American Planning Association. He has been working in the community and environmental advocacy field for 36 years. From 1979 to 1987 he worked for the Maryland Department of Natural Resources and spent ten of those years as director of the Maryland Save Our Streams program.

In 1987, the author founded Community & Environmental Defense Services (www.ceds.org), a company which assists people in resolving their concerns about activities posing a threat to a neighborhood or the environment. Since 1987 he has evaluated hundreds of proposed development projects for impacts to neighborhoods, aquatic systems, and other environmental resources. These projects range from a single acre to massive residential-commercial complexes and range from coast to coast. In most cases these evaluations result in recommendations for minimizing impacts while allowing applicants to achieve most of their goals. The author has testified before many administrative and judicial decision-makers both as a lay and expert witness.

Over his 36-year career the author has helped citizens with just about every form of growth and growth impact imaginable; not just those presented in *How To Win Land Development Issues* but many more. This experience allows Mr. Klein to quickly identify the impacts likely to result from a proposed development project and to swiftly formulate winning solutions. His background as both an agency insider and citizen advocate also allows the author to effectively negotiate with regulatory staff and other decision-makers. This experience accounts for the unusually high success rate (75%) of CEDS in resolving citizen concerns.

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Andrew Sharpley, Ph.D.
In 2006, Andrew Sharpley joined the Department of Crop, Soil and Environmental Sciences, University of Arkansas, Fayetteville. He is Co-Chair of the Division of Agriculture's Environmental Task Force and Discovery Farms Program. He received degrees from the University of North Wales, United Kingdom in 1973 and Massey University, New Zealand in 1977, and spent 25 years with the USDA-ARS in Oklahoma and then Pennsylvania. His research investigates the cycling of phosphorus in soil-plant-water systems in relation to soil productivity and water quality and includes the management of animal manures, fertilizers, and crop residues. He also evaluates the role of stream and river sediments in modifying phosphorus transport and response of receiving lakes and reservoirs. He developed decision making tools widely used by US EPA and NRCS for agricultural field staff, to identify sensitive areas of the landscape and to target management alternatives and remedial measures that have reduced the risk of nutrient loss from farms. He is Editor-in-Chief of the Soil Science Society of America, in 2008 was inducted into the USDA-ARS Hall of Fame, and in 2012 received the Christopher Columbus Foundation Agriscience Award. Dr. Sharpley serves on National Academy of Science Panels and EPA's Scientific Advisory Board.

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President and Executive Director, Water Stewardship, Inc.

Tom Simpson was a Professor of Soil Science at VA Tech and University of Maryland prior to founding Water Stewardship, Inc. in 2008 where he is Senior Scientist and Executive Director for Water Stewardship Inc. He manages the organization and provides scientific leadership in developing new and innovative approaches and tools that support conservation assessment, verification and implementation primarily related to water quality. Dr. Simpson led WSI's development of assessment and verification protocols for farm conservation and ecosystem service markets and developed the logic framework for the WSI Nutrient Load Estimator software. He helps lead efforts on systems approaches to BMP implementation, and BMP interactions and function at the landscape level in the U.S. and internationally. He led the 2006-2009 project to revise definitions and efficiencies for Chesapeake Bay Program BMPs. Dr. Simpson has written numerous papers and book chapters on soil and water quality and BMP effectiveness and has served on numerous expert panels to inform policy decisions and continues to provide science support to both public and private decision makers.

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Gordon Smith, Ph.D
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Since 1994, Gordon Smith, Ph.D., has worked on mitigating greenhouse gas emissions by changing land use. He has expertise in forest carbon sequestration, avoided forest emissions (REDD+), soil carbon, manure management, fertilizer nitrous oxide, and soil methane. Dr. Smith has worked world wide on the entire spectrum of mitigation, including modeling likely emission benefits of project and programmatic activities, policy analysis for governments, standard and methodology development for offset registries, project development, project and methodology validation and verification, and verifier accreditation. He is an expert in biomass carbon sampling efficiency and designing sampling systems to meet precision goals. He is on the editorial board of the journal *Greenhouse Gas Measurement & Management*, is a member of the Greenhouse Gas Management Institute advisory committee, is a VCS expert in afforestation/deforestation, improved forest management, avoided deforestation (REDD), and agricultural land management, and is a member of the ACR AFOLU Technical Committee. He is currently Carbon Development Director for the REDD project developer Wildlife Works.

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Low Impact Development (LID) Specialist, District of Columbia Department of Environment

Rebecca Stack serves as the Low Impact Development (LID) Specialist for the District of Columbia Department of Environment. Her work focuses on removing barriers to wide spread implementation of LID in the District. She collaborates across the public and private sector and works with permit reviewers to incorporate LID into projects. Rebecca received her civil engineering degree from Northeastern University and has researched bioretention field performance at University Maryland College Park. Rebecca has several years teaching experience including stream restoration, water quality and wetland ecology courses. Rebecca is currently leading the effort to update the District of

Columbia's Stormwater Management Guidebook to include the latest suite of low impact development BMPs. Rebecca is a co-principal investigator on several District-wide research projects including a neighborhood scale investigation of the effects of low impact development retrofits on stormwater volumes.

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Robert Traver, PhD, PE, D.WRE
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Robert Traver is a Professor in the Department of Civil and Environmental Engineering at Villanova University, and Director of both Center for the Advancement of Sustainability in Engineering, and the Villanva Urban Stormwater Partnership. He has conducted research on topics that include modeling of stream hydraulics, urban hydrology, water quality, and sustainable stormwater management. He initiated the Stormwater Best Management Practice Demonstration and Research Park on the Villanova Campus. Dr Traver served on ASCE's External Review Panel (ERP) of the Corps investigation of Hurricane Katrina, and was a member of the National Academies Committee entitled *Reducing Stormwater Discharge Contributions to Water Pollution*. Dr Traver received his BSCE degree from the Virginia Military Institute, his MCE from Villanova, and his Ph.D. from The Pennsylvania State University. He is a licensed Professional Engineer.

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Dana York
President, Green Earth Connection, LLC

Dana York retired from the Natural Resource Conservation Service in January 2011 after a 34- year career with the Agency. She has formed a consulting group, Green Earth Connection to bring her expertise to the agricultural and environmental communities. Her training and organization leadership experience is also used to help organizations become more effective and efficient within current, expanding or decreasing resources. Her expertise includes: training and implementing BMP Identification projects, nutrient management, nutrient trading, the EPA Chesapeake Bay model and partnership building. She specializes in the development of dynamic business plans and project implementation with implementable and measurable goals and actions.

Prior to her retirement she was the Director of the Watershed and Landscape Programs Division, NRCS, in January 2010, where she directed the NRCS Watershed, Conservation Technical Assistance and Conservation Initiatives Programs. These programs assist communities with planning and implementing natural resource conservation on private lands from individual farms to large-scale watershed projects. She also coordinated the Agency's targeted efforts in large watersheds such as the

Chesapeake Bay, Great Lakes and Upper Mississippi River Basin. Prior to returning to Washington, she was the Senior Advisor to the Chesapeake Bay Program in Annapolis, MD. As the Senior Advisor, she was the Agency's representative at the Environmental Protection Agency's Bay Program office and worked to implement the 2009 Chesapeake Bay Presidential Executive Order. From 2004 to 2009 she served at the Associate Chief for the Natural Resources Conservation Service. As the Associate Chief she managed the agency's overall programs and operations, including a $3.2 billion annual budget.

She joined the NRCS National Headquarters staff in 1999 as a special assistant to the Chief and then as the Acting Director of Budget Planning Analysis Division, which is responsible for all Agency budget formulation. In 2001, she became the director of the NRCS Operations Management and Oversight Division with responsibility for the agency's operations management, including monitoring operations, business planning and accountability, and development and monitoring of accountability information systems. She also led the agency's efforts on quality assurance, oversight and evaluation.

York began her 34-year career with the former Soil Conservation Service (SCS) as a student trainee while attending Tennessee Technological University. She has held various positions with the agency in Tennessee, Georgia and Ohio, including Soil Conservationist, District Conservationist, State Resource Conservationist, Partnership Liaison and Deputy State Conservationist.

York is a native of Tennessee. She received a Bachelor of Science degree in Agricultural Science from Tennessee Technological University and a Master's degree in Industrial/Organizational Psychology from Middle Tennessee State University with an emphasis in organizational design and measurement, business planning and leading organizations and employees through change.

In September of 2007 Dana was awarded the President's Distinguished Rank Award, which is the highest award a career employee can receive for their career as a Senior Executive. In 2008 she received 2008 Agricultural Alumnus of the year from Tennessee Technological University.

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Dan Zimmerman
Manager, Warwick Township, Lancaster County

As manager of Warwick Township since 1994, Dan Zimmerman oversees the day to day operations of the Administration, Public Works, and Police Departments. He also serves as the Administrator for the Warwick Township Municipal Authority. During his tenure, he has implemented a successful Transfer of Development Rights program. He continues to work with the Lancaster County Agricultural Preserve Board, Farmland Trust, and property owners to facilitate the Township's agricultural preservation program. He also works cooperatively with multiple agencies, land owners and developers to improve traffic movement through Warwick Township, including extensive improvements along the SR 501 corridor. Mr. Zimmerman has also fostered an innovative Lititz Run watershed management plan and a township-wide trails program. He serves as Secretary to the Lititz Run Watershed Alliance, and continues to facilitate stream improvement projects in Warwick Township.

Before joining Warwick Township, Dan was Manager of Mount Joy Borough, Lancaster County, for seven years, and was with Hanover Borough, Lancaster County, also for seven years. He served as the Region Four Representative for the Lancaster County Planning Commission from 1992 to 2004, including serving as Chairman in 2001 and 2002. Dan has served on the Lancaster County Metropolitan Planning Organization since 1992, and is also Vice-Chairman of the Lancaster County Transportation Authority, which he has served on since 2000. Dan has also been a member of the Lancaster County Agricultural Preserve Board since 2005. He serves as Secretary to the Lititz Run Watershed Alliance, and is a member of the Pennsylvania Planning Association. He holds both a Masters and Bachelors degree from Shippensburg University.

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Panel Role in Development of the Verification Framework

Since being formally convened in September 2012,[5] the Panel has met in three face-to-face meetings (December 6, 2012, August 28-29, 2013, April 1, 2014 and April 2, 2014) and through five conference calls (October 12, 2102, June 19, 2013, July 31, 2013, October 31, 2013, and November 1, 2013). In carrying out its charge to date, the Panel has reviewed and provided feedback in the following areas:

- Reviewed and provided comments on the draft BMP verification principles to the BMP Verification Committee following its introductory conference call in October 2012;
- Heard detailed briefings from the six technical source sector workgroup chairs and coordinators on their initial draft BMP verification protocols and provided detailed feedback during the course of the Panel's December 2012 meeting;
- Provided initial feedback and recommendations on plans for clean-up of historic BMP databases back to the chair and coordinator of the Bay Program's Watershed Technical Workgroup;
- In response to detailed briefings on the steps being considered for ensuring full access to federal cost shared conservation practices and addressing double counting, Panel members provided the U.S. Geological Survey team with specific feedback and recommendations;
- Provided several rounds of feedback to the workgroups' chairs and coordinators on their draft and revised draft sets BMP verification guidance;

[5] Invitation letters were sent to the 13 nominated panelists on September 18th, 2012. The letters are available online at http://www.chesapeakebay.net/groups/group/bmp_verification_review_panel, under the "Projects & Resources" tab.

- Provided a comprehensive set of recommendations directed to the workgroups, jurisdictions, and BMP Verification Committee in November 2013; and

- Provided a Jurisdictional Verification Protocol Design Table to the jurisdictions and the six technical sector workgroups in April 2014 for use in drafting protocols and finalizing guidance, respectively.

Panel's Findings and Recommendations

As a follow through to its face to face meeting in August 2013 and follow-up conference calls in October and November 2013, the Panel drafted and distributed its *Chesapeake Bay Program Partnership BMP Verification Review Panel's Guidance and Recommendations to the Six Source Sector Workgroups, the CBP BMP Verification Committee, and the Seven Watershed Jurisdictions*[6] (Appendix D). In April 2014, the Panel met in joint session with the BMP Verification Committee and reached agreement on moving forward up through the Bay Program on the revised draft basinwide BMP verification framework.

[6] Chesapeake Bay Program Partnership BMP Verification Review Panel's Guidance and Recommendations to the Six Source Sector Workgroups, the CBP BMP Verification Committee, and the Seven Watershed Jurisdictions. Distributed November 19, 2013. http://www.chesapeakebay.net/channel_files/21511/cbp_bmp_verif_review_panel_recommendations_11_19_2013.pdf

Appendix D: Chesapeake Bay Program BMP Verification Review Panel's Guidance and Recommendations to the Six Source Sector Workgroups, the CBP BMP Verification Committee, and the Seven Watershed Jurisdictions

Distributed November 19, 2013

The Chesapeake Bay Program (CBP) Partnership's BMP Verification Review Panel (Panel) is providing the following guidance and recommendations based on its reviews to date of the six source sector workgroups' draft BMP verification protocols and the July 15, 2013 draft basinwide BMP verification framework document. The Panel's guidance and recommendations are directed towards the following groups within the larger Partnership:

- The six source sector workgroups—Agriculture, Forestry, Stormwater, Wastewater Treatment, Streams, and Wetlands—to provide them with guidance as they finish their work on their current draft BMP verification protocols;

- To the seven watershed jurisdictions to assist each of them as they build on their existing BMP tracking and reporting programs and enhance them to address the challenge of ensuring all reported practices are implemented and operating correctly; and

- To the BMP Verification Committee, providing them with the Panel's recommendations for addressing several elements of the larger basinwide BMP verification framework.

Keep the Focus on Verification Which Supports Effective Implementation

Through the adoption of its set of five BMP verification principles, the CBP Partnership has already clearly established its intentions by defining verification as:

> "the process through which agency partners ensure practices, treatments, and technologies resulting in reductions of nitrogen, phosphorus, and/or sediment pollutant loads are implemented and operating correctly."

The Panel strongly recommends the workgroups, the committee, and the jurisdictions keep in mind that the Partnership has a clear, working definition of what constitutes "verification".

Also recall that the Partnership recognized in the same principles document that "working to verify that practices are properly designed, installed, and maintained over time is a critical and integral component of transparent, cost efficient, and pollutant reduction effective program implementation."

Guidance and Recommendations to the Six Workgroups

Workgroups: You Provide Guidance, Jurisdictions Develop Protocols. To date, the six workgroups have been writing BMP verification 'protocols.' The Panel believes the seven watershed jurisdictions, not the workgroups, will have the challenge in spelling out the detailed protocols—specific, step by step 'how to' descriptions of conducting verification of practices—within their respective quality assurance plans. The workgroups have the responsibility for providing the jurisdictions with their best professional judgments about the level and type of inspections, surveys, or other verification techniques which will provide a robust level of confidence that the reported best management practices have been installed and are operating correctly. The Panel asks each workgroup to please re-label their existing draft protocols as guidance when finalized.

Workgroups: Use the Urban Stormwater Workgroup Narrative as a Model to Follow. The Panel believes the Urban Stormwater Workgroup's draft protocol narrative provides the right level of detail, content, and format of documentation, including very descriptive rationales, needed to walk a reader through what needs to be considered, why, and how in developing more specific verification protocols. The Panel recommends the other five workgroups work to adopt the strengths of the Urban Stormwater Workgroup's draft protocol narrative into their final guidance documents. The Panel also recommends full consideration be given to organizing each workgroup's guidance by practices being implemented through regulatory programs, practices that are cost-shared, and practices that are non cost-shared.

Workgroups: Use the Verification Program Design Matrix in Developing Your Guidance. The Chesapeake Bay Program BMP Verification Program Design Matrix (*Attachment A*) illustrates the Panel's thinking about the components, elements, and element options for designing the jurisdictions' BMP verification programs. The source sector workgroups should also consider using the series of program elements, stated in the matrix as questions, to confirm their guidance is providing the jurisdictions with as many answers to these questions as appropriate and possible.

Workgroup: Consider these 14-steps when Developing Your Verification Guidance. The Panel recommends each workgroup review the 14 development considerations and questions (*Attachment B*), which prompt specific decisions by the jurisdictions as they work to enhance their current BMP tracking and reporting programs to include verification. Workgroups should ensure that the jurisdictions can use the workgroup's guidance to help work through the 14-steps and answer the applicable questions.

Workgroups: Use the State Protocol Components Checklist. The Panel recommends the workgroups use the state protocol components checklist (*Attachment C*) to help ensure their respective BMP verification guidance provides the jurisdictions with the information they will need to develop their more detailed BMP verification protocols.

Workgroups/Verification Committee: Additional Submission Documents for Protocol Approval. The Panel believes clearly articulated jurisdictional verification protocols should not require substantial additional information. The Panel also believes that the source sector-specific submission documentation should be similar between sectors within a jurisdiction. Therefore,

the Panel recommends that the workgroups develop guidance if they determine the jurisdictions will need to provide any addition documentation along with the submittal of their source sector specific verification protocols. For these cases, the Verification Committee may want to review existing draft jurisdictions' quality assurance plans documentation requirements (see Section 13 Jurisdictional BMP Verification Documentation Expectations in the July 15, 2013 draft basinwide framework document) and/or develop what is to be submitted with the state's sector protocols and the approval process or signoff requirements for submission and approval.

Workgroups: Consider the Panel's Comments on Your Draft Protocols. The Panel reviewed each workgroup's June 2013 draft BMP verification protocols during the Panel's August 28-29 Panel meeting. Each workgroup should fully consider the bulleted comments from Panel members (*Attachment D*) as the workgroup transitions its draft BMP verification protocol into final guidance.

Workgroups/Jurisdictions: Group Practices and Verification Options Together. The Panel recommends grouping BMPs and providing common verification guidance for related sets of practices.

Workgroups: Aim High. The Panel challenges the workgroups to provide their recommendations on "robust" levels of inspection and corresponding schedules for verifying their source sector's suite of practices, treatments, and technologies. The Panel is seeking the workgroups' best professional judgment about the types and frequency of inspection which are needed to provide a high level of confidence that the BMPs are truly installed and operating to meet the assigned removal efficiencies..

Workgroups: Define How to Verify and at What Frequency. The Panel recognizes that the six workgroups have the technical expertise to provide the jurisdictions with guidance on how to best verify individual or groups of practices, using what suite of possible techniques, and what frequency. The Panel asks that the workgroups provide their best expert advice to the jurisdictions on the appropriate verification systems/methods and frequency of inspection.

Workgroups: Address Inspection Frequency for Functional Equivalents. In the case of verifying functionally equivalent practices, the Panel asks the workgroups to provide the jurisdictions with distinct Functional Equivalent Practice definitions so the practice can be reliably identified and reported. Workgroups may need to consider guidance on more frequent inspections to confirm continued presence and functionality over shorter life spans depending on the functional equivalent definition and assigned lifespan.

Workgroups: Provide Guidance on Intensity of Verification Choices. The Panel asks that the workgroups provide the jurisdictions with guidance on seeking more periodic statistical survey-based (e.g., more intensive spot-checks) verification if jurisdictions make the choice not to undertake more site-specific verification up-front (e.g., the jurisdiction initially depended on self certification).

Workgroups: Confirm Cross-Walks between CBP BMPs and NRCS/State BMP Practice Design Definitions/Standards. The Panel recommends each workgroup either develop new or

confirm the validity of the cross-walks between existing NEIEN-based CBP approved BMP definitions and the state reported BMPs based on NRCS/state practice definitions/standards to assure the CBP applied BMP efficiency/land use change is correct.

Workgroups (and the Committee and Jurisdictions): Establish Practice Life Spans and Use within Verification Guidance/Protocols/Programs. The Panel does support continued crediting of a practice after its recorded lifespan as long as the proper level of re-verification occurs confirming the practice is still present and functioning. The Panel recommends the following steps be taken in factoring practice life spans into the **workgroup's** BMP verification guidance, the **Committee's** basinwide framework, and the **jurisdictions'** BMP verification programs:

- For the existing Chesapeake Bay Program Partnership approved BMPs, the respective source sector **workgroup** needs to assign a life span/expiration date for each approved BMP. In doing so, the workgroups need to consider contract/permit life span, engineering design life span, and actual life span.
- For all future BMP expert panels convened by the Chesapeake Bay Program Partnership, the **workgroups** need to ensure each panel is charged with establishing a recommended life span/expiration date for each of the practices at which time them must be re-verified or be removed from the data submitted for crediting.
- **Workgroups** need to develop specific guidance for how to sunset specific reported practices which have gone beyond their lifespan and have not received the level of required re-verification after the designated lifespan and the **jurisdictions** need to build systems for carrying this out within the larger verification programs.
- The **Committee** needs to develop specific guidance that ensures the Chesapeake Bay Program Partnership's NEIEN-based BMP reporting system specifically addresses the issue of practice life span, including building in a system for flagging reported practices which are past their established life spans, and confirmation there was follow up re-verification of their continued presence and functional or removal from the data submitted for crediting.

Workgroups/Jurisdictions: As BMP implementation strategies, products, and technologies develop, workgroups and jurisdictions may be able to change the method used to verify practice implementation. For example as satellite and remote sensing techniques continue develop, the accuracy of their use as compared with on the ground inspection will increase.

Guidance and Recommendations to the Seven Jurisdictions

Jurisdictions: Use the Verification Program Design Matrix in Developing Your Program. The Panel envisions the jurisdictions using the BMP Verification Program Design Matrix (*Attachment A*) to structure their BMP verification programs, using the series of program elements as a series of prompts to ensure they have fully considered everything needed to be documented in their individual BMP verification protocols.

Jurisdictions: Consider these 14 Development Decisions steps when Creating Your Verification Program. The Panel recommends each jurisdiction walk through the 14 steps and questions (*Attachment B*) prompting specific decisions along the way as they work to enhance their current BMP tracking and reporting programs to include verification.

Jurisdictions: Use the State Protocol Components Checklist. The Panel plans to evaluate the jurisdictions' BMP verification programs and their underlying BMP verification protocols using the state protocol components checklist (*Attachment C*). The Panel recommends the jurisdictions use this checklist to ensure their individual verification protocols include all the necessary components as appropriate. The final state protocols should be reviewed to make sure they meet the intent of the five Verification Principles.

Jurisdictions: Address Certification/Training of Verifiers in Your Programs. The Panel recommends each jurisdiction clearly document the certification and training requirements for those personnel involved in all the steps of the verification program. The Panel recommends jurisdictions:

- Describe the required qualifications/certification for the personnel who are carrying out the various elements of the jurisdiction's verification program;
- Ensure certification/training programs are in place for those individuals involved in verification and data entry to assure individuals are qualified to do either task;

Jurisdictions: Aim High or Explain Why. The Panel asks jurisdictions to adopt the "robust" levels of verification described in the respective workgroups' guidance or explain in their quality assurance plan why they cannot, recognizing the legal as well as funding issues that may impede high levels of verification.

Jurisdictions: Prioritize Verification Towards Priority Practices. Jurisdictions should feel empowered to target their verification programs and most robust verification protocols towards those practices on which the jurisdictions' are depending on the most to achieve the nutrient and sediment pollutant loads reductions through their Watershed Implementation Plans (WIPs). For verification of lower priority practices, jurisdictions can rely on less intensive methods of verification. Specifically, statistical sampling methods can be considered if there is a large BMP population and the jurisdiction is able to reliably extrapolate findings rather than visit every site.

Jurisdictions/Workgroups: Robust Upfront Verification Yields Less Intensive Follow up Reviews. The more intense the on-site review of a specific practice (i.e., in person review vs. a paper review), the less intense the required follow up spot-checking will be after the fact. For example, if a BMP has been visually reviewed in the field, a less rigorous sample may be needed for evaluating continued BMP functionality into the future.

Jurisdictions: Understand the Basis on which the Panel will Evaluate Your Draft Verification Program. The Panel intends to refer to following source materials during its review of the seven jurisdictions' BMP verification programs:

- The Chesapeake Bay Program Partnership's five BMP verification principles;

- The six source sector workgroups' sets of BMP verification guidance;
- The checklists and matrix provided in the Panel's November 2013 guidance and recommendations; and
- The Chesapeake Bay Program Partnership's final published basinwide BMP verification framework document.

The Panel strongly encourages jurisdictions to ensure their proposed verification programs are consistent with the principles and guidance agreed to and adopted by the CBP Partnership through the Principals' Staff Committee.

Jurisdictions: Build in time for Continuous Improvement Early. The Panel recommends more intensive review of new verification systems early in their initial implementation to adjust for unforeseen outcomes of the selected system design. It is not unusual to have to make adjustments to the protocols, personnel, documentation tools/electronic systems implementation and use. The more a system is tested prior to full scale implementation, the better the protocol implementation outcomes and protocol accuracy will be.

Guidance and Recommendations to the BMP Verification Committee

Committee: Ensure Adoption of Consistent Nomenclature and Accepted Definitions. The Panel recommends the Partnership as a whole adopt and use the following definitions in all its individual partners' and collective programmatic descriptions and documentation of verification, particularly in place of the terms like "third party". Each of these terms has significant implications when they are used in verification guidance and protocols, each carrying with it time and resource investment implications. The use of the terms "independent" and "external independent" and parts of the wording for the definitions below were drawn directly from publications on the topic of peer review authored by the National Research Council, the U.S. Army Corps of Engineers, and the U.S. Environmental Protection Agency.

> Independent Review: a review carried out by someone within the same organization having technical expertise in the subject matter to a degree at least equivalent to that needed for the original work, but who was not involved as a participant, supervisor, technical reviewer, or advisor in the development or operations of the program/practice under review.
>
> External Independent Review: a review carried out by a separate outside organization with technical expertise in the subject matter to a degree at least equivalent to that needed for the original work. Generally, this level of review is sought when considering key decisions that are being made that could affect overall programs.

Committee: Seek to Strengthen Ability to Verify CBP Defined BMPs. To date, the Partnership's process for developing, reviewing, and approving BMPs has never directly incorporated consideration of verification. The focus has been on nutrient and sediment reduction efficiencies, how to track and report BMPs, and how to credit the estimated nutrient and sediment load reduction capabilities of BMPs through one of the Partnership's Bay models. In order to verify practices have been implemented and are operating correctly, this means the

verifier must have distinct BMP definitions/standards in hand so that the BMP may be reliability reported with using the approved verification method. Therefore, in addition to relying on existing standards like NRCS conservation practice standards, the Panel recommends the Partnership needs to build into its BMP protocol process assistance from its future expert panels in providing distinct practice definitions which incorporate descriptive elements which can be checked by anyone involved in the verification process and result in similar verification findings.

Committee: Further Strengthen Commitment to Transparency. The Panel invested significant time discussing and considering how to ensure the Partnership's commitment to transparency was, in fact, transparent.

The Panel recommends the following changes in the word choices for the final version of the transparency addendum to the BMP verification principles:

> "The measure of transparency will be applied to three primary areas of verification: data collection, data **validation** ~~synthesis~~ and data reporting."
>
> "Transparency of the process of data collection must incorporate **clearly defined** ~~independent~~ QA/QC procedures, which may be implemented by the data-collecting agency or by an independent **external** ~~third~~ party."
>
> "Transparency of the data reported should be transparent at the **most site-specific** ~~finest possible~~ scale that conforms with legal and programmatic constraints, and at a scale compatible with data input for the Chesapeake Bay Program partnership modeling tools."

The Panel recommends that aggregated data can be used, be considered validated, be provided to the public, and still be considered consistent with the Partnership's transparency principle if there is independent verification/validation of the underlying data.

The Panel recommends adding the following recommendation to Section 15 of the July 15, 2013 draft basinwide BMP verification framework document:

> "All practice and treatment data reported for crediting of nutrient and sediment pollutant load reductions and used in some form by the Chesapeake Bay Program Partnership in accounting for implementation progress should be made publically accessible through the Partnership's Chesapeake Stat website. Conforming with legal and programmatic constraints, the reported practice and treatment data should be publically available to at the most site-specific scales, in order of preference: site-level, followed by subwatershed, municipality, county, and then state."

Committee: Provide Functional Equivalency Guidance. The Panel recommends the Committee provide the jurisdictions with clear guidance on how to best go about setting up specific verification methods for the crediting of non-cost shared practices as functionally equivalent. This will require establishing distinct practice standards and accepted practice definitions and the review and connection to existing CBP definitions and efficiencies or the

creation of new expert panels to develop the appropriate credit for functional equivalents in the CBP Partnership's models and decision support tools.

Committee: Treat Cost-Shared and Non Cost-Shared Practices the Same in Terms of Applying Privacy Restrictions. The Panel recommends the Partnership allow for the same privacy protections provided to cost shared data for non-cost shared data not associated with a regulated entity. This means the partners would follow the same privacy and aggregation requirements, for example, under Section 1619 of the Farm Bill for both cost shared and non cost-shared reported agriculture conservation practices.

Committee: Provide Partners with Access to Statistical Design Expertise. The Panel recommends adding the following recommendation to Section 15 of the July 15, 2013 draft basinwide BMP verification framework document:

> "The Chesapeake Bay Program Partnership will develop, fund, and maintain a long term mechanism through which the seven watershed jurisdictions can directly access statistical survey design experts and expertise in support of continued implementation and adaptation of their verification programs."

Committee (and Jurisdictions): The Panel recommends the Partnership work with its Scientific and Technical Advisory Committee to develop and implement a the longer term process of collecting, analyzing, and then using scientific evidence that will assist in quantifying the performance of the individual and collective reported BMPs. Analyses of such data would focus on evaluating the degree of consistency with the pollutant load reduction efficiency adopted by the CBP Partnership and estimated pollutant reductions simulated by the Chesapeake Bay Program Partnership's suite of models and other decision support tools. Applying the results of these analyses, following an adaptive management process, can help the CBP partners refine BMP efficiencies, jurisdictional policy decisions, and support continued research and development into new BMPs. This is not recommended as a required program component of a jurisdiction's verification protocol, but based on jurisdictional and larger Partnership ability to collect this data, and further work by outside experts, the findings could assist in the confirming the accuracy of the existing BMP efficiencies and CBP Partnership's Chesapeake Bay watershed model predictions. Monitoring and a certain amount of performance checks may be required for each jurisdiction to collect adequate data for determining actual BMP performance.

ATTACHMENT A

Chesapeake Bay Program Best Management Practice Verification Program Design Matrix

The Matrix should be used to guide development of both the six source sector workgroups' BMP verification guidance as well as the seven jurisdictions' BMP verification programs.

The Matrix includes three columns that contain program components and elements along with an initial listing of element options for designing BMP verification programs.

A. Program Component. This column contains the three main parts of a comprehensive jurisdictional BMP verification program**:**

i) BMP Verification—Step #1 in the verification process is where a BMP is determined to be implemented and operating correctly.

ii) BMP Data Validation—Step #2 in the verification process is to determine if the data was collected, compiled, and submitted per Chesapeake Bay Program guidance.

iii) BMP Performance—Step #3 in the longer term process of collecting, analyzing, and then using scientific evidence that will assist in quantifying the performance of the individual and collective reported BMPs and the degree of consistency with the pollutant load reduction efficiency adopted by the CBP Partnership and estimated pollutant reductions simulated by the Chesapeake Bay Program Partnership's suite of models and other decision support tools. Applying the results of these analyses, following an adaptive management process, can help the CBP partners refine BMP efficiencies, jurisdictional policy decisions, and support continued research and development into new BMPs. <u>This is not a required program component</u> of a jurisdiction's verification protocol, but based on jurisdictional ability to collect this data, and further work by outside experts, the findings could assist in the confirming the accuracy of the existing BMP efficiencies and Chesapeake Bay watershed model predictions. Monitoring and a certain amount of performance checks may be required for each jurisdiction to collect adequate data determining actual BMP performance.

B. Program Elements—This column contains 16 verification program elements, phrased as questions, which jurisdictions must consider when designing their verification program.

C. Program Element Options—This column describes some examples of the options that may be considered to meet each program element, listed in order of most (highest confidence) to least intensive (lowest confidence) checks for BMP verification. There could be numerous sub-element options not listed here depending on the BMP type and data collection method. Jurisdictions are encouraged to consult the respective source sector workgroup's BMP verification guidance for these additional options. For data validation and BMP performance, the basic and preferred element options are presented.

ATTACHMENT A

Chesapeake Bay Program Best Management Practice Verification Program Design Matrix

A. Program Component	B. Program Elements	C. Program Element Options
i. BMP Verification	1. What was the driver for BMP Installation?	Regulation, Cost-share, Non-cost-share
	2. How many BMPs will be inspected?	All, percentage, subsample, those targeted
	3. How is the frequency and location of inspections determined?	Statistics, targeting, law, available funding
	4. How often are BMPs/groups of BMPs inspected?	Benchmark in BMP implementation timeline, 0-<1 yr, 1yr, 1-3 yr, >5 yrs
	5. What is the method of inspection?	Field visual, aerial, paperwork review, phone/paper survey
	6. Who will conduct the BMP inspection and are the certified/trained?	Regulatory agency, non-regulatory agency, independent party, self-reported
	7. What needs to be recorded for each BMP inspection?	Meets specifications/standards, visual functioning, location
	8. Is execution of the inspection process documented in and checked against an updated quality assurance (QA) plan?	QA plan in place, program checked and amended to ensure compliance, QA plan in place but not actually applied, no QA plan

	9.Into what type of system is collected data entered?	Database, spreadsheet, written files	
	10. At what resolution are results reported out to EPA and/or the public?	Individual practice level, site-level, by sub-watershed, by county, by state	
ii. BMP Data Validation	11. What is the QA/QC process to prevent double-counting or counting of BMPs no longer in place?	BASIC: Database/paper check of adequate statistical sample	PREFERRED: Visual field check of adequate statistical sample
	12. What is the method used to validate state's ability to collect and report correct data?	BASIC: Database/paper check of adequate statistical sample	PREFERRED: Visual field check of adequate statistical sample
	13. If data is provided by external independent party or industry, what method is used to provide adequate quality assurance for acceptance by the Chesapeake Bay Program Partnership?	BASIC: Database/paper check of adequate statistical sample	PREFERRED: Analytical comparison to a know database and review of data collection procedures.
	14. Who conducts data validation?	BASIC: Non-regulatory agency	PREFERRED: Regulatory Agency, independent external party
iii. BMP Performance	15. What is the process to collect data to assess BMP performance and confirm consistency with BMP efficiencies in Chesapeake Bay models?	BASIC: Visual field assessment of statistical sample (check for signs of failure)	PREFERRED: Analytical measurement of performance for a statistical sample (water quality monitoring, soils test, manure sample, etc)
	16. Who collects BMP effectiveness data?	BASIC: Non-regulatory agency, nongovernmental organization	PREFERRED: Regulatory Agency, university

ATTACHMENT B

Jurisdictional BMP Verification Program
Development Decision Steps for Implementation

Below are the 14 steps for each Chesapeake Bay watershed jurisdiction to consider when developing their jurisdiction's BMP verification program. Under each step are questions for consideration which will prompt decisions that may be needed to develop jurisdiction's verification protocols.

1) Determine what BMP's to collect:

a) Do you want to collect all BMPs that were listed to in your jurisdiction's Phase II WIP? Additional/or some other combination of BMPs?
b) Do the listed BMPs meet NRCS standards, state standards, and/or Chesapeake Bay Program (CBP) definitions?
c) Do you want to report BMPs that are considered functionally equivalent (they do not meet NRCS standards, state standards, or CBP definitions but do result in nutrient and/or sediment pollutant load reductions)?
d) When collecting the selected BMPs, do you have the year they were implemented?
e) For reported BMPs, are you collecting all the BMP elements required for the CBP model determination (example: for cover crops, to do you have species, date planted, kill down date, fertilization if any) or will you take the lowest credited efficiency available?
f) Have the selected BMPs been approved by the CBP Partnership? If not, do the BMPs have CBP Partnership provisional acceptance status as an interim BMP?
g) Are the practices you plan to collect worth the cost of collection?

2) Determine where to collect BMP's:

a) Depending on the BMPs you choose to collect, at what level will you report these? (i.e., site specific scale; on a county level; on a (sub-) watershed level, etc.)?
b) Does the whole state need to be canvassed or only certain areas where there is a resource concern or particular practice implementation (i.e., Eastern shore vs. rest of state)?

3) Protocol—How to Collect BMP's:

a) What system/method have you decided to use to collect the BMPs?
b) If the BMP is only present at a certain time of the year (i.e., cover crops, conservation tillage, etc), does your verification method and associated workload requirements take this into account?
c) What is the cost benefit ratio on the system selected (high, medium, low)?
d) Do you have current funding for the BMP collection system selected?
e) Do you plan to collect BMPs in the selected areas only during certain seasons of the year, throughout the fiscal year, or will it take several years to determine if they are properly functioning?
f) Has your selected system been accepted by the people who will be collecting the BMPs—i.e., Conservation Districts, municipalities, state agencies, farm community, special interest groups, NGO's, USDA, EPA, USFWS, or other federal entities?

4) **BMP verification system development:**
   a) What system/method will be used for verification of collected BMPs?
   b) Does it require: trained state or federal employees; other trained specialists; self-certification; or technological expertise (i.e., aerial photograph interpretation)?
   c) Has your selected system been approved by the appropriate workgroup in the CBP Partnership?

5) **Training on selected data collection and verification systems:**
   a) Do you have written guidance and documentation on the data collection and verification systems?
   b) How will you train data collectors and verifiers to use the selected system/method (i.e., in person, webcast, etc.)?
   c) Does your system require independent verification?
   d) Is there a "certification requirement" for anyone who collects data and a follow-up CEU requirement?
   e) Who do the data or verification collectors call if there is a question?

6) **Use of existing electronic data collection system or update/development of new systems:**
   a) Does the electronic data collection and storage system exist for recording BMP implementation, or do you have to build a new one, or make adjustments to the existing system?
   b) What is the cost to develop/updates or create the system and do you have funding?
   c) How long will the system be viable (due to technology or other changes)?
   d) What is the ease of use for the BMP verifiers and data entry personnel?
   e) What is the ease of use for the landowner (if applicable in self certification)?
   f) Where will the data be maintained and is the system secure?
   g) Is the system mapped to provide the data required to NEIEN and to the Chesapeake Bay Program Office?
   h) Who will transmit data?
   i) How will you update the data in the future and remove BMPs that are not being maintained, no longer in use, no longer in existence, or expired?
   j) Does the electronic system have standard reports that can be provided to leadership or others if requested or will someone have to build reports?
   k) Have you taken into account BMPs that may have more than one funding source so that you do not have double counting?
   l) Is the data available to the public? Do you have appropriate FOIA, Section 1619 or other protection needed for the data?

7) **Training on data entry:**
   a) Will the training on the selected data entry system be given by: reading documentation or guidance documents; group training; net meetings; field training; or any combination?
   b) Will there be a "certification" requirement to use the data entry system?
   c) If you are recording initial verification determinations on paper, how to you make sure it is accurately entered into the electronic system?
   d) Will training be required for the landowners (if they are entering data)?
   e) How and when is the best time to conduct the training for data entry personnel?

f) Will there be a "certification" requirement for those who enter data?

8) Pilot of collection, verification and data entry systems:

a) Where will the state pilot the data collection and verification systems?
b) How long will the pilots(s) take?
c) Who will be involved in the pilot (s)?
d) How will debriefing be conducted to determine pilot success and/or system changes needed after the pilot?

9) Reliability and validity testing of the new system:

a) Reliability assures that every time you ask the data collection question, you get the same answer. How will you test this?
b) Validity is when you compare what you collected to another system of collection, to see if you get the same or a similar answer. How will you test? (Example: looking at the same data in another system like the Chesapeake Bay Program Partnership's Chesapeake Stat web site, USDA's CEAP and NASS data systems, etc.)

10) Adjust systems and training:

a) After testing the systems, how will you implement adjustments you have to make and are there documentation changes, system changes, or re-training all involved, in making the changes?

11) Implement tested and adjusted data collection and verification systems:

a) After you have tested the system you should re-test the adjusted system to make assure you still have adequate reliability and validity of the data.
b) If the tested system changes the use of the system, documentation, output of data, timeline for collection, you may need to re-train all employees.
c) Realize that new systems are very seldom right the "first time" implemented.
d) Allow for the system to operate without continuous changes (usually one year, unless the problem is really significant) for data collection personnel to get used to the system.
b) Set up a system for users to report problems to system designers.

12) Spot Checking Procedures

a) What method is used to select the statistical sample for quality assurance?
b) What documentation is needed for spot check findings?
c) What actions will be taken if problems are found (i.e., additional training, removal or correction of data in system, etc.)

13) Communication Strategy:

d) Do you need to prepare and conduct communication strategies for: the data collection event; landowners; local, state or federal leadership; general public?
e) How will information be provided: written, electronic, news or media public meetings or any combination?
f) Do you want feedback about what you propose to do before you start the process?
g) Will you make changes if you accept feedback?

h) Will there be communication of findings throughout the process or at a specific time in the process?
i) Who does the landowner or general public call if they have questions?
j) Will there be a published document of the findings and outcomes of the collection of BMPs?

14) Future Year Systems: Things to Think About

a) As BMP technologies or the electronic computer systems change, will you be able to change how often you collect and verify data (i.e., moving from on the ground collection to satellite imaging)?
b) Will new technology change how to determine if the practice is still in existence or needs to be re-verified?
c) How will you remove practices from the database that are not being maintained, no longer in existence, or have expired in the future?
d) If you use different systems in the future, have you gone through all of the above steps?

ATTACHMENT C

State Protocol Components Checklist				
	State:			
	Sector:			
	BMP Verification	Present	N/A	Comments
1	**BMP's Collected**			
	Type (Structural, Management, Functional Equivalent, Etc)			
	BMP Funding/Cost shared (Federal, State, NGO, Non-cost shared)			
	Distinct State Standards/Specfications			
	Matching CBP Definition/Efficiencies			
2	**Method/ System of Verification/Assessment**			
	Description of Methods/Systems To Be Used			
	Documentation of procedures used to Verify BMP's			
	Instruction Manual for system users			
3	**Who will complete Verification**			
	Qualification Requirements			
	Training Requirements			
	Certification Requirements			
	CEU Follow-Up Training Requirements in Future			
4	**Documentation of Verification Finding**			
	Date of Installation			
	Location (Lat/Long if applicable)			
	Level of Reporting (Watershed, HUA, County, site specific etc)			
	Units (Number, Acres, Length, etc.) needed for NEIEN			
	Ownership (public, private)			
	Documentation:			
	Pictures			
	Worksheets			
	Electronic Tool			
	Arial Photos			
	Maps			
	Other			

	Report Generator			
5	**How Often Reviewed (Cycle of review)**			
	1-2 Years			
	5 Years			
	10 Years			
	Other			
6	**Independent Verification of Finding**			
	Is this a requirement?			
	Internal Independent			
	External Independent			
	BMP Data Validation			
7	**Quality Assurance/Spot Checking**			
	Who- Qualifications/Training/Certification			
	Method to Select BMP for Spot Check			
	Method to Select the Number of BMP's to Review			
	Other			
8	**Data Entry of BMP Implementation**			
	What is System?			
	Who enters Data (Training/Certification)			
	Does System connect to NEIEN?			
	System in Place prevent Double Counting			
9	External Provided Data Validation meeting CBP Guidance			
	Method to validate data			
	Who will validate data- certification/training?			
10	**Historic Data Verification**			
	System to re-certify or Remove			
	Who (training/certification)			
	Documentation of Action			
	BMP Performance			
11	Does state collect data to assess BMP Performance?			
	System Used to collect BMP performance data?			

	Who collects BMP performance data?			
	Who Analyses collected data and report to CBP?			
12	**Additional Comments/Requests**			
13	**CBP Approval Process: (TBD)**			

Jurisdictional Assurance that Protocols Meets Five Verification Principles:

1) Practice Reporting

2) Scientific Rigor

3) Public Confidence

4) Adaptive Management

5) Sector Equity

ATTACHMENT D

Chesapeake Bay Program Partnership's BMP Verification Review Panel Feedback to the Workgroups on their June 2013 Draft BMP Verification Protocols

The following is the cumulative feedback from the Panel to directed back to the respective workgroups' chairs and coordinators coming out of the Panel's August 28-29, 2013 meeting. The complete summary of the August Panel meeting is available on-line at: http://www.chesapeakebay.net/S=0/calendar/event/20832/.

Agriculture Workgroup

- Need to be clear up front exactly who is the audience of the Agriculture Workgroup's protocol—the public or the states—and write the supporting narrative with that target audience in mind.
- The matrix is very difficult, if not impossible to fully understand and comprehend.
- The use of checks, x's and question marks in the matrix was very confusing.
- The Workgroup should consider should consider breaking up the single matrix into four separate tables as opposed to attempting to include everything into a single table.
- Still need clarify on what exactly is the 80 percent threshold and exactly how does it apply?
- Does the 80 percent threshold have to apply to verification of all BMPs?
- Does the 80 percent threshold it apply to all programs or could there be different requirements for more important programs?
- If a state wants to report a practice and demonstrate its underlying verification protocol meets the 80 percent or better threshold, who or what entity will approve their method?
- Need to document just how defensible the 80 percent threshold level is and how practical/achievable it is.
- Did not see clear documentation of specific procedures which yielded an 80 percent or higher threshold in the Tetra Tech documentation.
- Need to provide the documentation necessary so the readers of the Workgroup's guidance fully understand that determining the 80 percentile threshold for a specific verification procedure is not based on a consideration of a set of quantitative criteria, but it is a qualitative evaluation by a still to be define group of experts.
- Need to address concerns about moving away from physical inspections by depending on a qualitative evaluation of a proposed survey techniques which would result in only a sub-sampling of all BMPs.
- Need to incorporate the data and information originally supplied in the relative cost and scientific defensibility columns (which were removed from the matrix) within the supporting narrative document.
- Need to clearly address how to verify functional equivalency.
- If functional equivalency is not defined based on reference back to an established practice standards/specifications, then is could be very subjective. How will the Agriculture Workgroup address this?

- Need to ensure that non-cost-shared practices have specific verification protocols, even though those protocols may be slightly different.
- Need to answer the question as to whether each reported BMP needs to meet the CBP BMP definition? What happens if is meets an NRCS practice standard but not a CBP BMP definition? Same questions for establishing functional equivalency?
- Why has the Agriculture Workgroup not stated up front that NRCS and FSA verification program necessarily meet the Agriculture Workgroup's protocol/CBP Partnership's BMP verification principles—instead suggesting this will likely be the case, but needs to be documented as so by each jurisdiction.
- Need to see actual descriptions of what are the actual inspection procedures similar to the procedures spelled out within the Urban Stormwater Workgroup's draft protocols.
- For most other sectors, those carrying out the verification protocols are not those directly involved in supporting the source sector itself whereas in the agricultural sector, the conservation districts are involved in both delivering services to the producers and conducting the verification procedures. Need to address concerns of how to achieve independency in inspections.
- Provide clear direction in the revised Workgroup's guidance that a state just can't re-submit the Agriculture Workgroup's matrix as their verification program documentation. The guidance should lay out the clear expectation that each state to provide detailed descriptions of their planned inspection/verification procedures for different sets of related practices.
- Need to address concern that the states can't necessarily verify on the basis of the CBP Partnership's adopted BMP definitions—they are not specific enough as NRCS standards are.

Forestry Workgroup

- Address concern about the percentage of forestry operations that are evaluated independently to verify accuracy of data.
- For expanded tree canopy, how do you determine if it's expanded given trees grow slowly? Through remote sensing or through planting data?
- How do you verify that buffers still function, e.g. reasonably uniform flow through buffer rather than channelized flow?
- On page 10 of Appendix J, confused what the four principles bullets are referring to.
- There is much more detail on the agriculture section of the protocol compared to the urban section.
- The first four practices are covered in Urban Stormwater Workgroup or Agriculture Workgroup's protocols—please confirm this is the case, as just want to make sure they are addressed in those protocols.
- Because of dependence on USDA cost share programs for supporting riparian forest buffers, page 13, really need the agriculture community to advise the Forestry Workgroup on the timing of inspections.
- On page 14, the section is marked "optional" when it really should not be considered optional.
- What counts as a professional program on page 7, Appendix J?

- What/who are these local partners and what is required to be defined as a local partner? Is there some level of expected training or professional certification required?
- Who is responsible for the gathering the data that would be used for this verification?
- For urban forest canopy, the Forestry and Urban Stormwater Workgroups need to make sure we are not double counting with urban stormwater verification protocol.
- Who is responsible for reporting the urban forestry practices in urban environments?
- Is verification every 5 years really enough?
- Unclear how data records would be obtained for what is done on private lands (non-cost shared practices).
- Need address concerns about the low frequency and adequacy (staffing) of inspections on private lands.
- Page 14, part 2: enhance appeal for monitoring. Is monitoring after planting 10 years later for determining functionality really being carried out? This section raises more questions than answers.
- If there is a loss of the urban tree canopy, then there is no credit given for those five years and any previous credit is lost (page 11, Appendix J). What is the reasoning behind that approach? Why take away any incentive for maintaining urban tree canopy. Seems a little extreme.
- Recommend the Workgroup consider clarifying the protocol text about removal of credit given specific situations.
- Why not include the agriculture and stormwater-forestry related BMPs in the agriculture or stormwater verification protocols. Could become a double counting issue.
- Was not clear what the actual forest harvesting BMPs were. Recommend adding a more complete list of these practices in the protocol description.

Urban Stormwater Workgroup

- For non-regulated (non-MS4) areas of the watershed, would it be valuable to distinguish between areas with high growth and low-growth?
- In the definitions, there is definitions for "'non-regulated" and "semi-regulated". Text refers to "semi-regulated" and "regulated", but did not see the non-regulated areas addressed.
- On what period would the sub-sampling be done for the non-regulated stormwater on Option 2?
- Would like to see a statistical sampling conducted more often, rather waiting for a more comprehensive evaluation of the entire population every 10 years.
- On page 20, treatment train of BMPs – how are they credited?
- Have no issue with inspections every 9-10 years. However, would emphasize the need for first year inspection of low impact development or LID practices.
- Would like to see emphasis on local jurisdictions' inspections of runoff reduction BMPs and stormwater retention practices every 3 years.
- Should we encourage a basin-wide version of Maryland's StormwaterPrint that could serve as basin-wide database for stormwater BMPs.
- For option 3, seems like bad idea to apply a subsample to other regions.
- Don't know if we are giving credit for legacy BMPs, but if we are crediting them, do we remove or reduce them?

- In stormwater programs for new and redevelopment, there are multiple inspections throughout the construction period and a final inspection upon completion, all which are not described in the protocol. In MS4 areas, there are inspections done every permit cycle. Provide documentation of the presence of all these inspections.
- Address recommendation that LID practices should be inspected annually.
- The Workgroup needs to revise option 3 on page 25 in terms of the low bar it sets.
- Confirm that is a BMP that is not inspected/verified should not be reported and credited—that was the basis for option 4 on page 25.
- Is it worth making a distinction between these voluntary BMPs and required BMPs if they are both implemented in stormwater regulated areas?

Wastewater Treatment Workgroup

- The reference to 'non-significant facilities' is a typo on first page (page 28)—please correct this.
- Document within the Workgroup's guidance that the NPDES system works only if there are numerical nutrient limits in the permit.
- Please clarify in the text that West Virginia does not have on-site treatment systems regulations in place, but the jurisdiction will follow the protocol for the verification of advanced treatment systems. Only three jurisdictions—Delaware, Maryland, and Virginia—have on-site treatment system programs/regulations in place right now.
- Add into the Workgroup's revised guidance the expert panel recommendations on inspection frequencies for on-site treatment systems.
- Need to make it much clearer on page 30 the on-site treatment system verification will focus on nitrogen-reducing treatment systems that are reported for load reduction credit.
- Need to address verification of septic system pumping in the protocol—without verification, no credit should be given.
- Need to address concerns raised concerns about the physical size of the on-site systems and whether that needs to be more specifically addressed in the protocol. Regulation of large systems varies by state, e.g., VA has VPDES requirements for systems above a certain volume.

Streams Workgroup

- There is nothing in the protocol that ties restoration and the stream to the surrounding watershed? Should there be?
- Need to provide clear documentation on the basis for the 25 year storm cutoff.
- Does this protocol apply to every stream restoration project earning credit?
- Who conducts the inspections?
- The draft protocol relies heavily on the function based stream assessments—what's timing for the underlying source publication and how well do the assessments align with data requested by the CBP?
- What is being described here is not really adaptive management (number 5 on page 42).
- The draft protocol seems to rely on function based stream assessments that are still under development: what's the status of the function based stream assessment framework.
- Need to address concerns that there is overlap between wetlands and stream restoration verification protocols.

- Need to document who is responsible for post-project monitoring.
- Page 43, number 10 seems to imply there needs to be a process to avoid double-counting, but there currently is no process?
- Suggest including upstream and downstream monitoring, particularly for protocol 4 projects.
- Still very unclear exactly who is responsible for conducting these inspections. There is a great opportunity to standardize the post construction monitoring within the Corps of Engineer's permit for the actual stream restoration project.

Wetlands Workgroup

- What is being described here is not really adaptive management.
- Much of the wetlands protocol references back to the agriculture and urban stormwater protocols so question whether this section is even needed.
- Several sections of the wetlands protocol includes language that cite lack of funds as a reason for likely not carrying out verification—the Panel asks the Workgroup to both remove that specific language and not develop its guidance on a basis of available funding.
- For wetland restoration projects, what percentage falls under government programs? Is there data on non-profit or other projects that could potentially be double-counted?
- Why don't we take the same approach as tree canopy—if we are not getting a net gain in wetlands (or restored streams) at the local level, we should not be giving credit at all.
- Forestry Workgroup suggested using imagery to verify that there is no net loss. Could this work for wetlands?
- Why not use the same protocol for verification for wetlands captured under the agriculture and stormwater sectors for wetlands being restored outside of these two sectors?
- What type of wetlands does the protocol actually apply to?

Appendix E. Ensuring Full Access to Federal Conservation Practice Data

It should be emphasized that the primary purpose of gaining complete access to Federal, State, and private agricultural conservation implementation data is to give the six watershed states a greater capacity for analysis and understanding of agricultural conservation practice implementation across the landscape, to support the adaptive management and targeting of conservation programs, to fully credit producers for their implemented conservation practices, and to promote success in attaining water-quality goals.

1619 Conservation Cooperator Agreements

The conservation assistance that is provided to farmers by the USDA is authorized under Section 1619 of the 2008 Farm Bill which states that, "USDA, or any contractor or cooperator of USDA, shall not disclose information provided by an agricultural producer or owner of agricultural land concerning the agricultural operation, farming or conservation practices, or the land itself, in order to participate in the programs of the Department . . ," except to agencies and individuals that have been established as USDA 1619 Conservation Cooperators (see Appendix B in Hively et al. 2013). This means that information that is used by a farmer to enroll in Federal agricultural programs is defined as confidential between the farmer and the Federal Government.

Organizations can be established as 1619 Conservation Cooperators if they agree to maintain data confidentiality and if their use of the data provides technical or financial assistance to USDA conservation programs. Signing a 1619 Conservation Cooperator Agreement provides the cooperator with confidential access to the USDA's datasets of conservation practice information. The data can be released to the public if they are aggregated so that farmer privacy is protected, as discussed below. These 1619 aggregation requirements are regularly followed by USDA agencies such as the National Agricultural Statistics Service when they are publishing county statistics. Farmers can also release their site-specific data on an individual basis.

The 1619 Conservation Cooperator Agreements can be authorized by State and regional officials of the NRCS or FSA. Ultimately, responsibility for enforcing Section 1619 of the 2008 Farm Bill lies with the FSA, and at the national level the FSA Privacy Officer (John

Table E-1. Status of 1619 Conservation Cooperator Agreements for each Chesapeake Bay state. These agreements facilitate access to USDA agricultural conservation data on a privacy protected basis. Source: Hively et al 2013

Jurisdiction	Agency	Purpose	Limits	Data covered	Start date	End date
Maryland	MDA	Assist NRCS in the delivery of conservation-related services.	Provide conservation-related services; monitor, assess, evaluate conservation benefits.	Not limited; lists specific data that may be viewed.	10/27/2009	None
New York	USC	Assist NRCS in the delivery of conservation-related services.	Provide conservation related services.	Not limited; lists specific data that may be viewed.	3/3/2011	None
Virginia	DCR	Provide technical assistance for USDA conservation programs.	Lists authorized activities including "compliance and status reviews."	Not limited; lists specific data that may be viewed.	12/4/2009	None
West Virginia	DA	Assist NRCS in the delivery of conservation-related services.	Provide conservation-related services.	Not limited; lists specific data that may be viewed.	4/7/2012	None
West Virginia	CA	Collect data to document and verify practices.	WV animal operations in the Potomac Basin.	Animal waste management and mortality disposal systems.	2/21/2012	3/1/2013
Federal	USGS	Provide technical assistance for a USDA program.	Monitoring, assessment, and evaluation; impact of farming practices on water-quality in the Chesapeake Bay watershed.	CRP and CREP, field boundaries, for States in Chesapeake Bay.	8/2/2010	9/30/2015
Federal	USGS	Provide technical assistance for a USDA program.	Monitoring, assessment, and evaluation; impact of farming practices on water-quality in the Chesapeake Bay watershed.	Farm Bill programs.	11/20/2010	9/30/2015

Underwood) has authority to review and approve 1619 Conservation Cooperator Agreements for both the FSA and NRCS and to sign for the FSA. Because the NRCS collaborates closely

with is sister agency in delivering conservation services, and NRCS planners have access to the FSA Common Land Unit field boundary dataset, the NRCS agreements tend to specify that they apply to both NRCS and FSA conservation information. Therefore, state jurisdictional agencies do not necessarily have to sign agreements with the FSA to gain access to FSA-managed conservation datasets, which include geospatial Common Land Unit (CLU) field boundaries as well as Conservation Reserve Program (CRP) and Conservation Reserve Enhancement Program (CREP) practices.

The agreements have start and end dates in most cases. The presence of an end date depends on the preference of the USDA signing official. Agreements may be amended by mutual agreement of all parties with signatory authority.

Chesapeake Bay States and Conservation Cooperator Agreements

Four watershed states—Maryland, New York, Virginia, and West Virginia—currently have established USDA 1619 Conservation Cooperator Agreements between the NRCS and one or more of their state conservation agencies. The remaining two states—Delaware and Pennsylvania—have not yet established conservation cooperator status for any of their state conservation agencies. The agreements state that "those individuals or organizations (governmental or nongovernmental) that assist the NRCS with providing conservation related services are known as NRCS Conservation Cooperators."

The following state agencies have established 1619 Conservation Cooperator Agreements with the USDA (Table 6) for the purpose of providing privacy-protected access to USDA conservation data:

- Maryland: Maryland Department of Agriculture (MDA)
- New York: Upper Susquehanna Coalition (USC)
- Virginia: Virginia Department of Conservation and Recreation (VA DCR)
- West Virginia: West Virginia Department of Agriculture (WVDA)
- West Virginia: West Virginia Conservation Agency (WVCA)

In addition, USGS has signed 1619 Conservation Cooperator Agreements with both NRCS and FSA.

Each of the six states has identified its state agency assigned with responsibility for submitting aggregated agricultural conservation practice data to the Bay Program's Annual Progress Review, through their respective state's NEIEN data transfer node. Those state agencies with responsibility for providing conservation services (e.g., technical assistance, cost share program administration) are also identified in Table E-2. These state agencies work in partnership with additional jurisdictional, regional, local, and Federal agencies and non-governmental organizations to collect and compile the necessary conservation practice

implementation data, often funded in the process by the EPA's Chesapeake Bay Regulatory and Accountability Program Grants to the jurisdictions.

Delaware

Delaware does not currently have a 1619 data sharing agreement. The Committee recommends establishing an agreement between USDA and the Delaware Department of Natural Resources and Environmental Control, the agency with responsibility for integrating conservation datasets and making the data submission to the Annual Progress Review through Delaware's state NEIEN node, as well as the Delaware Department of Agriculture and the Delaware Forest Service. The Committee recommends adopting the broadest and most up to date language for each key factor of the 1619 agreement—purpose, limits, aggregation, privacy, and access—as described within Hively et al. 2013.

Maryland

In Maryland, the Department of Agriculture (MDA) has been established as a 1619 Conservation Cooperator with the NRCS. Supported by this jurisdictional 1619 data-sharing agreement, Maryland has developed an integrated "Conservation Tracker" database that is used within each Conservation District office to document Federal, State, and nongovernmental organizations' financial assistance and conservation practices installed without Federal or State financial assistance. This database has made it comparatively easy for Maryland to eliminate double counting and accurately report conservation practice implementation. MDA compiles and aggregates the Conservation Tracker dataset, joins the resulting data with additional jurisdictional databases documenting cover crops, manure transport, and nutrient management;

Table E-2. State jurisdictional agencies that have been approved by the USDA for participation in 1619 data-sharing agreements to support the objectives of the NRCS Chesapeake Bay Watershed Initiative and increase the capacity for consistent, integrated analysis, and reporting of conservation practice implementation data for the Chesapeake Bay watershed. Source: Hively et al 2013

Jurisdiction	Agency	Role	1619 agreement in place?
Delaware	DE-DNREC	Responsible for NEIEN submission.	No
	DE-DA	Provides conservation services.	No
	DE-FS	Provides conservation services.	No
Maryland	MDA	Provides conservation services.	Yes
	MDE	Responsible for NEIEN submission.	No
New York	USC	Provides conservation services.*	Yes
	NY-DEC	Responsible for 2013 NEIEN submission	No
Pennsylvania	PA-DEP	Responsible for NEIEN submission.**	No
	PA-DA	Provides conservation services.	No
Virginia	VA-DCR	Provides conservation services.	Yes
	VA-DEQ	Responsible for NEIEN submission.	No
West Virginia	WV-DEP	Responsible for NEIEN submission	No
	WV-DA	Provides conservation services	Yes
	WV-CA	Provides conservation services	Yes

and then transmits the aggregated data to the Maryland Department of the Environment (MDE), which is the lead Maryland agency for operation and maintenance of Maryland's State NEIEN node.

The Committee recommends that Maryland continue to operate under its existing Maryland Department of Agriculture 1619 agreement, and consider, during any future amendments to the agreement, adopting broader language regarding access, specifically including the phrase "*data can be obtained from USDA, directly from farmers, or from Federal established 1619 Conservation Cooperators.*" The Committee recommends that Maryland consider establishing 1619 status for specific individuals within the MDE, the agency responsible for the NEIEN data submission. Maryland would also benefit by investing the time to compare USGS-sourced data with jurisdiction-sourced data from Maryland Department of Agriculture to check for accuracy and identify any useful information that one or the other of the datasets might be missing.

New York

In New York, the Upper Susquehanna Coalition (USC) has been established as a 1619 Conservation Cooperator with the NRCS. The USC is made up of various collaborators within the Soil and Water Conservation Districts serving the area of New York in the Chesapeake Bay watershed. The USC currently provides an umbrella organization whereby pertinent personnel from the multiple organizations that collaborate with New York Soil Conservation Districts can gain authorized access to USDA privacy protected conservation data. Because the portion of New York that falls within the Chesapeake Bay watershed is relatively small (comprising 16 Soil and Water Conservation Districts), the USC has established a method of meeting with each of its member Soil and Water Conservation Districts to obtain annual conservation implementation data. During this process, the USC also collects information on practice implementation from partners such as the NRCS and Cornell Cooperative Extension.

The USC's Soil and Water Conservation Districts organize conservation data within the New York's Agricultural Environmental Management (NY AEM) framework that they use to track both State and federally financed conservation practices. The NYAEM is part of the overall Agricultural Environmental Management umbrella, which, by State law, partners the New York State (NYS) Department of Agriculture and Markets, the NYS Soil and Water Conservation Committee, and the Soil and Water Conservation Districts in a multifaceted program for conservation on farms. Within this framework the USC has developed an online tool to record and report State and federally financed conservation practices. Although the NYAEM online tool was not used for progress reporting in 2012, it has the potential to make it comparatively easy for the USC to eliminate double counting and accurately and consistently report conservation practice implementation for the Bay Program's Annual Progress Review.

In 2013, responsibility for operation and maintenance of New York's State NEIEN node (in terms of submission of annual Chesapeake Bay watershed agricultural conservation practice data) was transferred from the USC to the NY State Department of Environmental Conservation (NY DEC). The Committee recommends that New York Department of Environmental Conservation consider establishing a 1619 data sharing agreement modeled after the existing Upper Susquehanna Coalition agreement, or become a signatory to the Upper Susquehanna Coalition agreement. Any new agreements would benefit from including more precise

language regarding data privacy (non-applicability of sunshine law) and data access (including the specific language "*data can be obtained from USDA, directly from farmers, or from Federal established 1619 Conservation Cooperators*") (see Hively et al. 2013).

Pennsylvania

Pennsylvania does not currently have a 1619 Conservation Cooperator agreement in place. In Pennsylvania, the Department of Environmental Protection has responsibility for reporting practices for the Bay Program's Annual Progress Review, including data submission through Pennsylvania's State NEIEN node. PA DEP has is the lead state agency provide conservation services. Because this agency does not have a 1619 agreement in place, in 2012 and again in 2013, Pennsylvania relied upon the USGS to provide an aggregated dataset of USDA conservation practices, which was then integrated with the jurisdictional spreadsheet of State-funded practices. The Committee recommends establishing an agreement between USDA and the Pennsylvania Department of Environmental Protection, adopting the broadest and most up to date language for each key factor of the 1619 agreement: purpose, limits, aggregation, privacy, and access.

Because Pennsylvania Department of Environmental Protection delivers conservation services and is also a regulatory agency, 1619 access should be limited to those individuals directly involved in preparing data for the Annual Progress Review. Soil Conservation Districts should work to establish an integrated tracking system for both Federal and State-sponsored conservation practices that operates under the cooperative data sharing agreements that have been signed between the NRCS and each individual Soil Conservation District. That system should be used to provide consistent aggregated data reports to the Pennsylvania Department of Environmental Protection, as well as to strengthen their infrastructure for providing conservation planning and implementation. The Committee also recommends that the Pennsylvania Department of Agriculture, which provides additional conservation services, also establish a 1619 agreement with USDA.

Virginia

In Virginia, the Department of Conservation and Recreation has been established as a1619 Conservation Cooperator with the NRCS. However, until 2013, VA DCR had full responsibility for reporting practices, including data submission to the Bay Program's Annual Progress Review—that responsibility has since transitioned over to the Virginia Department of Environmental Quality. The Virginia 1619 agreement limits data access to the specific individuals within VA DCR that is responsible for the Annual Progress Review. Because neither the Department of Conservation nor the Department of Environmental Quality has an integrated Federal-State data tracking system, this person obtains USDA conservation practice data by requesting them from the Virginia State NRCS office, where the data are compiled by querying the NRCS Integrated Data for Enterprise Analysis (IDEA) database. This data- set is then integrated with the jurisdictional database of State-funded practices and the data are aggregated prior to submission to the Annual Progress Review by using node client software for reporting extensible markup language files.

The Committee recommends that Virginia continue to operate under its existing Virginia Department of Conservation and Recreation 1619 agreement, but plan to amend the agreement to

adopt broader language regarding purpose and limits (explicitly including "*monitoring, assessing, or evaluating of conservation benefits from USDA conservation programs")* and more precise language regarding privacy (non-applicability of sunshine law) and data access (include "*data can be obtained from USDA, directly from farmers, or from Federal established 1619 Conservation Cooperators*"). It may also be necessary to broaden or update the list of individuals within the Virginia Department of Conservation and Recreation who are permitted access to the data.

The Committee recommends that Virginia Department of Environmental Quality establish a 1619 agreement, particularly since the 2012 point person for conservation data handling has moved from the Virginia Department of Conservation and Recreation to the Virginia Department of Environmental Quality. Since Virginia Department of Environmental Quality is a regulatory agency, any agreement should limit access to those individuals that are directly involved in conservation data reporting.

West Virginia

In West Virginia, the Department of Agriculture has been established as a 1619 Conservation Cooperator with the NRCS but cannot share unaggregated conservation practice information with the West Virginia Department of Environmental Protection, which is the agency responsible for submitting data through West Virginia's State NEIEN node. The West Virginia Conservation Agency was also established as a cooperator with the NRCS under a memorandum of understanding covering only animal waste disposal and poultry mortality disposal in the Potomac Basin. Although West Virginia is a 1619 Conservation Cooperator (via the West Virginia Department of Agriculture and West Virginia Conservation Agency), NRCS staffing and priorities led the Department of Environmental Quality to rely upon the USGS to provide aggregated datasets of 2012 and 2013 USDA conservation practices, which was then integrated with the jurisdictional database of State-funded practices and submitted through West Virginia's State NEIEN node.

The Committee recommends that West Virginia continue to operate under its existing WVDA 1619 agreement, but plan future amendments to the agreement to adopt broader language regarding limits (including the specific language "*monitoring, assessing, or evaluating of conservation benefits"*) and access (include "*data can be obtained from USDA, directly from farmers, or from Federal established 1619 Conservation Cooperators*") (see Hively et al. 2013).

The Committee also recommends that the West Virginia Conservation Agency and the West Virginia Department of Environmental Protection establish 1619 agreements with USDA to promote consistent access to conservation data. Because West Virginia Department of Environmental Protection is a regulatory agency, any agreement should limit access to those individuals that are directly involved in conservation data reporting.

All Chesapeake Bay Watershed States

Interestingly, the two jurisdictions with the most comprehensive 1619 agreements—Maryland and New York—have established jurisdictional integrated databases of federal and state-sponsored agricultural conservation practices. This allows these two states to directly track cost-shared conservation practices regardless of the source of financial assistance (State, Federal, or private) and address the removal of double counting in a relatively

straightforward manner. It also has greatly simplified their annual reporting to the Bay Program's Annual Progress Review. These results imply that Virginia, for example, might benefit from establishing a combined jurisdictional database of Federal and State practices. Currently, Virginia has a labor-intensive data submission process, owing to the State's use of record-by-record comparison for removal of double-counted practices, as described below. The other states—Delaware, Pennsylvania, and West Virginia—would likely great benefit from developing similar systems for integrating Federal and State-sponsored agricultural conservation practices.

Establishing New 1619 Conservation Cooperator Agreements

The following jurisdictional agencies with responsibility for conservation data reporting *do not* currently have 1619 Conservation Cooperator Agreements in place and must rely upon obtaining aggregated conservation data from their collaborators:

- *Delaware Department of Natural Resources and Environmental Control*—Receives aggregated conservation practice data from the conservation districts and the USGS, and submits the data to the Bay Program's Annual Progress Review through the Delaware NEIEN node.

- *Maryland Department of the Environment.*—Receives aggregated conservation practice data from Maryland Department of Agriculture and submits the data to the Bay Program's Annual Progress Review through the Maryland State NEIEN node.

- *New York Department of Environmental Conservation*—Assumed responsibility for submission of data to the New York NEIEN node in 2013, working in partnership with the Upper Susquehanna Coalition.

- *Pennsylvania Department of Environmental Protection*—Receives aggregated conservation data from conservation program leads, conservation districts, and the USGS, and submits the data for the Bay Program's Annual Progress Review through Pennsylvania's State NEIEN node. The Department of Environmental Protection is the Pennsylvania State agency with direct responsibilities for planning, funding, delivery, reporting, and submission of conservation-practice data. In addition to providing conservation services, it is also a regulatory agency.

- *Virginia Department of Environmental Quality*—Assumed responsibility for the Annual Progress Review from the VA DCR in 2013, and a number of conservation programs were also transitioned from the VA DCR to VA DEQ following recently enacted legislation.

- *West Virginia Department of Environmental Protection*—Receives aggregated conservation data from the West Virginia Department of Agriculture, the West Virginia Conservation Agency, and the USGS, and submits the data for the Bay Program's Annual Progress Review through West Virginia's State NEIEN node.

Several additional state agencies that are directly involved in conservation planning, funding, delivery, and reporting of conservation-practice data also do not have 1619 data-sharing agreements in place:

- *Delaware Department of Agriculture*—Currently provides aggregated jurisdictional records to the DE-DNREC for use in reporting to the Bay Program's Annual Progress Review.

- *Delaware Forest Service*—Promotes forestry conservation practices with USDA financial assistance.

- *Pennsylvania Department of Agriculture*—Promotes conservation practices in collaboration with the USDA and PA DEP.

- *West Virginia Conservation Agency*—Has established a 1619 agreement covering animal waste and mortality data only. The agency currently provides aggregated conservation data to the WVDEP.

In support of the NRCS Chesapeake Bay Watershed Initiative (CBWI), the NRCS has encouraged jurisdictional conservation agencies that do not have 1619 agreements in place to request to establish one (Hively et al. 2013). Each of the jurisdictional agencies listed in Table 7 has been vetted and approved by the FSA Privacy Officer, in collaboration with the NRCS regional conservationists, as eligible for USDA 1619 Conservation Cooperator status because the agency supplies conservation technical assistance to NRCS programs under the definitions established by the NRCS Chesapeake Bay Watershed Initiative (Hively et al. 2013).

The two lists above do contain state regulatory agencies including the DE DNREC, MDE, NY DEC, PA DEP, VA DEQ, and WV DEP, although most of these agencies also have direct responsibility for planning, funding, and implementation of conservation practices and provide conservation technical assistance to farmers. Several of the NRCS State Conservationists in the Chesapeake Bay have stated that 1619 agreements will not be provided to regulatory agencies. However, it is possible to word 1619 agreements to specifically limit access to the few key individuals within those agencies who are responsible for conservation data reporting (see suggested language in Appendix B:10 in Hively et al. 2013). For example, at the USGS only employees who have signed an internal 1619 data-handling agreement with specific data-use objectives (see Appendix B:8 in Hively et al. 2013) are allowed access to the protected conservation dataset. A similar strategy could be used by the state agencies (e.g., Virginia Department of Conservation and Recreation) to maintain a firewall between regulation and conservation implementation/reporting while still allowing critical staff access to the USDA dataset to assist in jurisdictional conservation reporting and management.

The existing Chesapeake Bay watershed jurisdictional 1619 agreements (see Appendix B:1-5 in Hively et al. 2013) are fairly consistent, but they differ in the wording of several key factors. As a result, there are some important differences in the level of data access provided by the agreements, with some jurisdictions including a broader array of programs and practices than others (Table E-1). The broadest language for each of the key factors, which will ensure full access to all USDA conservation practice data, is provided on page 6 in Hively et al. 2013. It should be mentioned that, despite differences in language, the effective interpretation of the

agreements by the NRCS has been fairly broad and uniform, and was sufficient to provide full access to USDA data by the signatory jurisdictions in 2012 and 2013.

Accounting for and Crediting Conservation Technical Assistance Data

Conservation technical assistance (CTA) data can be accessed by the jurisdictions with 1619 agreements in place, but the jurisdictions have not been submitting the data for nutrient and sediment pollutant load reduction credits due to concerns about possible double counting (e.g., differentiating between NRCS and state funded CTA) and lack of verification.

Jurisdictional Access to Chesapeake Bay CEAP Data

The Bay Program partners are working with USDA to ensure the jurisdictions with 1619 agreements in place can get access to the appropriately geographically summarized CEAP data use for in assessing whether their BMP tracking, verification and reporting programs are effectively capturing non cost-shared agricultural conservation practices. Access to the CEAP data can also help the jurisdictions better target implementation of the conservation delivery programs and services.

Recommendations for Ensuring Full Access to Federal Conservation Practice Data

The bottom line objective remains the same: ensuring that all six states have full access to all federally cost shared conservation practice data to be used to eliminate any double counting, to support effective conservation program implementation, and fully credit their producers for their nutrient and sediment load reduction implementation actions. To ensure that all six Chesapeake Bay watershed jurisdictions obtain full and complete access to all Federal cost-shared agricultural conservation practice data, the BMP Verification Committee recommends that the six Chesapeake Bay watershed states:

1) Adopt the broadest, most consistent language in the existing Maryland, New York, Virginia, West Virginia, and USGS 1619 agreements as described on page 6 in Hively et al. 2013;

2) Institute 1619 data sharing agreements in Delaware and Pennsylvania and for all jurisdictional agencies in Maryland, New York, Virginia, West Virginia listed in Table E-2 which have direct responsibilities for planning, funding, delivery, reporting, and/or submission of agricultural conservation practice data; and

3) Establish an annual data handling protocol that will ensure routine, thorough, and consistent data access for all USDA Farm Bill agricultural conservation programs. This uniform data access can be tailored to formats that integrate effectively within each state's respective conservation tracking and reporting system.

When considering signatories for 1619 agreements, it's important to consider all state agencies that have responsibility for data compilation, data submission to NEIEN network node, and involvement in funding and directing staff to deliver technical and financial assistance for implementing agricultural conservation programs on the ground. The BMP Verification Committee recommends that each of the listed jurisdictional agencies in Table E-2, particularly those directly involved in the NEIEN submissions, sign their states' 1619 agreements to gain

access to privacy protected USDA conservation data records. This would greatly increase the capacity for integrated analysis, preventing double counting, and reporting of conservation implementation. Furthermore, it would support the use of a single data request to obtain USDA data for all six states, which would promote equity in conservation reporting across the Chesapeake Bay watershed.

The BMP Verification Committee recommends adopting consistent 1619 language for each of the key elements within the Chesapeake Bay Conservation Cooperator agreements as identified by USGS—purpose, limits, aggregation, data, and access (see page 6 in Hively et al. 2013). Taking this approach would greatly assist the jurisdictions in meeting the objective of increasing capacity for analysis and understanding of implementation in support of adaptive management of conservation programs, as well as establishing consistency and accuracy in reporting of USDA conservation data among the Chesapeake Bay watershed jurisdictions.

Further, the BMP Verification Committee recommends that the six states, USDA, and other appropriate partners sign a cover page referencing the attached six state-specific 1619 agreements collectively ensure all six states have full access to federal cost shared practice data. This recommendation replaces the original proposal for a single, integrated six-state 1619 agreement and acts to document to continued commitment by all the parties to ensure these separate agreements continue to support the collective partnership's commitment to ensuring full access to federal cost shared practices.

The USGS report by Hively et al. (2013) provides a draft 1619 agreement template that adopts suggested language for establishing a 1619 agreement between a Chesapeake Bay watershed jurisdictional agency and the USDA. The recommended language was reviewed and approved by the USDA FSA Privacy Officer (see Appendix B in Hively et al. 2013).

APPENDIX F

Integrating Federal and State Data Records to Report Progress in Establishing Agricultural Conservation Practices on Chesapeake Bay Farms

By W. Dean Hively, Olivia H. Devereux, and Peter Claggett

Open-File Report 2013–1287

U.S. Department of the Interior
U.S. Geological Survey

APPENDIX F

U.S. Department of the Interior
SALLY JEWELL, Secretary

U.S. Geological Survey
Suzette M. Kimball, Acting Director

U.S. Geological Survey, Reston, Virginia: 2013

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Foreword

Introductory comments from collaborators at the Natural Resources Conservation Service:

United States Department of Agriculture

NRCS

Natural Resources Conservation Service
P.O. Box 2890
Washington, D.C. 20013

Recent years have shown increasing focus on the establishment of resource management systems to protect natural resources and maintain production capacity. Since its establishment, the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) has been a strong provider of farm conservation planning and implementation. In the 2008 Farm Bill, the Chesapeake Bay watershed received enhanced funding ($188 M over five years) to target agricultural conservation practices to priority watersheds. And the 2009 Executive Order for Chesapeake Bay Protection and Restoration has promoted cooperation among federal and state agencies and non-governmental organizations working to restore water quality in the Chesapeake Bay watershed.

The Chesapeake Bay Program Partnership has provided a forum in which Federal and State agencies, along with farmers and municipalities and non-governmental organizations that developed, coordinated and implemented strategies for managing resources and improving water quality. In 2010, NRCS entered a partnership with the United States Geological Survey (USGS) establishing USGS as a Conservation Cooperator with privacy-protected access to USDA farmland datasets. The USGS, as an impartial scientific third party, has coordinated with the NRCS and the Chesapeake Bay Program Partnership and assisted in the compilation of an accurate, comprehensive dataset that has been well integrated with the jurisdictional datasets that are also used to assess, track, and report progress in conservation practice implementation. In addition to the USGS, the USDA has supported the establishment of Conservation Cooperator Agreements with the various jurisdictional agencies that support conservation implementation. NRCS participates in these agreements to facilitate agricultural producers receiving appropriate recognition for their conservation practices. NRCS role was to provide the data for this report and NRCS does support continued use of its data for acknowledgement of the environmental improvement effects resulting from conservation practice implementation.

We appreciate the role and expertise provided by USGS in supporting the effort to improve the accuracy and completeness of conservation datasets in the Chesapeake Bay watershed. Consistent and thorough reporting of NRCS supported conservation practices will be beneficial to the Chesapeake Bay Program jurisdictions in their efforts to quantify progress toward their conservation goals. In addition, with this information, the federal and state partnership can better target future conservation activities and funding. We want to ensure that producers' conservation activities on agricultural lands are fully acknowledged, support adaptive management of conservation programs to promote effective solutions, and address resource concerns while promoting sustainable agricultural practices.

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Associate Chief for Conservation

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Regional Conservationist, Northeast

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Conversion Factors

Inch/Pound to SI

Multiply	By	To obtain
	Length	
mile (mi)	1.609	kilometer (km)
	Area	
acre	4,047	square meter (m^2)
acre	0.4047	hectare (ha)

SI to Inch/Pound

Multiply	By	To obtain
	Length	
meter (m)	3.281	foot (ft)
kilometer (km)	0.6214	mile (mi)
	Area	
square meter (m^2)	0.0002471	acre
hectare (ha)	2.471	acre

Horizontal coordinate information is referenced to the North American Datum of 1983 (NAD 83).

APPENDIX F

Abbreviations

AMAP	NRCS Agricultural Management Assistance Program
AWEP	NRCS Agricultural Water Enhancement Program
BMP	Best Management Practices
CBP Partnership	Chesapeake Bay Program Partnership
CBRAP	Chesapeake Bay Regulatory and Accountability Program
CBWI	NRCS Chesapeake Bay Watershed Initiative
CDSI	NRCS Conservation Delivery Streamlining Initiative
CLU	FSA Common Land Unit polygon shapefiles
CRP	FSA Conservation Reserve Program
CREP	FSA Conservation Reserve Enhancement Program
CTA	NRCS Conservation Technical Assistance
DE-DA	Delaware Department of Agriculture
DE-DNREC	Delaware Department of Natural Resources and Environmental Control
DE-FS	Delaware Forest Service
EPA	U.S. Environmental Protection Agency
EQIP	NRCS Environmental Quality Incentives Program
FSA	USDA Farm Service Agency
GIS	Geographic Information Systems
IDEA	NRCS Integrated Data for Enterprise Analysis
MDA	Maryland Department of Agriculture
MDE	Maryland Department of the Environment
MIDAS	FSA Modernize and Innovate the Delivery of Agricultural Systems project
NEIEN	National Environmental Information Exchange Network
NCP	NRCS National Conservation Planning database
NRCS	USDA Natural Resources Conservation Service
NYS	New York State
NY-AEM	New York Agricultural Environmental Management Program
NY-DEC	New York Department of Environmental Conservation
PA-DA	Pennsylvania Department of Agriculture
PA-DEP	Pennsylvania Department of Environmental Protection
PII	Personally identifiable information
PLANT	Lancaster County, PA, Planning and Tracking Portal
PRS	NRCS Performance Results System database
REAP	NRCS Resource Economics, Analysis and Policy Division
SCIMS	USDA Service Center Information Management System
TMDL	Total Maximum Daily Load
USC	Upper Susquehanna Coalition
USDA	U.S. Department of Agriculture
USGS	U.S. Geological Survey
VA-DCR	Virginia Department of Conservation and Recreation
VA-DEQ	Virginia Department of Environmental Quality
WHIP	NRCS Wildlife Habitat Incentive Program
WQGIT	CBP Partnership's Water-quality Goal Implementation Team
WVCA	West Virginia Conservation Agency
WVDA	West Virginia Department of Agriculture
WVDEP	West Virginia Department of Environmental Protection

APPENDIX F

Integrating Federal and State Data Records to Report Progress in Establishing Agricultural Conservation Practices on Chesapeake Bay Farms

By W. Dean Hively, Olivia H. Devereux, and Peter Claggett

Abstract

In response to the Executive Order for Chesapeake Bay Protection and Restoration (E.O. #13508, May 12, 2009), the U.S. Geological Survey (USGS) took on the task of acquiring and assessing agricultural conservation practice data records for U.S. Department of Agriculture (USDA) programs, and transferred those datasets in aggregated format to State jurisdictional agencies for use in reporting conservation progress to the Chesapeake Bay Program Partnership (CBP Partnership). Under the guidelines and regulations that have been developed to protect and restore water-quality in the Chesapeake Bay, the six State jurisdictions that fall within the Chesapeake Bay watershed are required to report their progress in promoting agricultural conservation practices to the CBP Partnership on an annual basis. The installation and adoption of agricultural best management practices is supported by technical and financial assistance from both Federal and State conservation programs. The farm enrollment data for USDA conservation programs are confidential, but agencies can obtain access to the privacy-protected data if they are established as USDA Conservation Cooperators. The datasets can also be released to the public if they are first aggregated to protect farmer privacy. In 2012, the USGS used its Conservation Cooperator status to obtain implementation data for conservation programs sponsored by the USDA Natural Resources Conservation Service (NRCS) and the USDA Farm Service Agency (FSA) for farms within the Chesapeake Bay watershed. Three jurisdictions (Delaware, Pennsylvania, and West Virginia) used the USGS-provided aggregated dataset to report conservation progress in 2012, whereas the remaining three jurisdictions (Maryland, New York, and Virginia) used jurisdictional Conservation Cooperator Agreements to obtain privacy-protected data directly from the USDA. This report reviews the status of conservation data sharing between the USDA and the various jurisdictions, discusses the methods that were used by the USGS in 2012 to collect and process USDA agricultural conservation data, and also documents methods that were used by the jurisdictions to integrate Federal and State data records, reduce double counting, and provide an accurate reporting of conservation practices to the CBP Partnership's Annual Progress Review. A similar tracking, reporting, and assessment will occur in future years, as State and Federal governments and nongovernmental organizations continue to work with farmers and conservation districts to reduce the impacts of agriculture on water-quality.

Introduction

The Chesapeake Bay watershed includes parts of six State jurisdictions—Delaware (DE), Maryland (MD), New York (NY), Pennsylvania (PA), Virginia (VA), and West Virginia (WV)—as well as the District of Columbia (DC). The Chesapeake Bay watershed (fig. 1) extends over 64,000 square miles and has the largest water-to-land ratio of any estuary in the world. Water-quality is impaired in 97 percent of the Chesapeake Bay estuary and its tidal tributaries because of the impacts of human population, land use, and development (U.S. Environmental Protection Agency, 2010). Agricultural land use has been identified as a large contributor of nutrient, sediment, and chemical nonpoint-source pollution to the estuary. Accordingly, there is a large and coordinated effort to restore water-quality through the use of conservation practices on agricultural lands. These practices can be implemented through financial assistance programs sponsored by U.S. Department of Agriculture (USDA) agencies, by the jurisdictions, or on a voluntary basis.

The Chesapeake Bay watershed State jurisdictions are required (U.S. Environmental Protection Agency, 2009) to report conservation practice implementation on an annual basis to the EPA Chesapeake Bay Program Office and the Chesapeake Bay

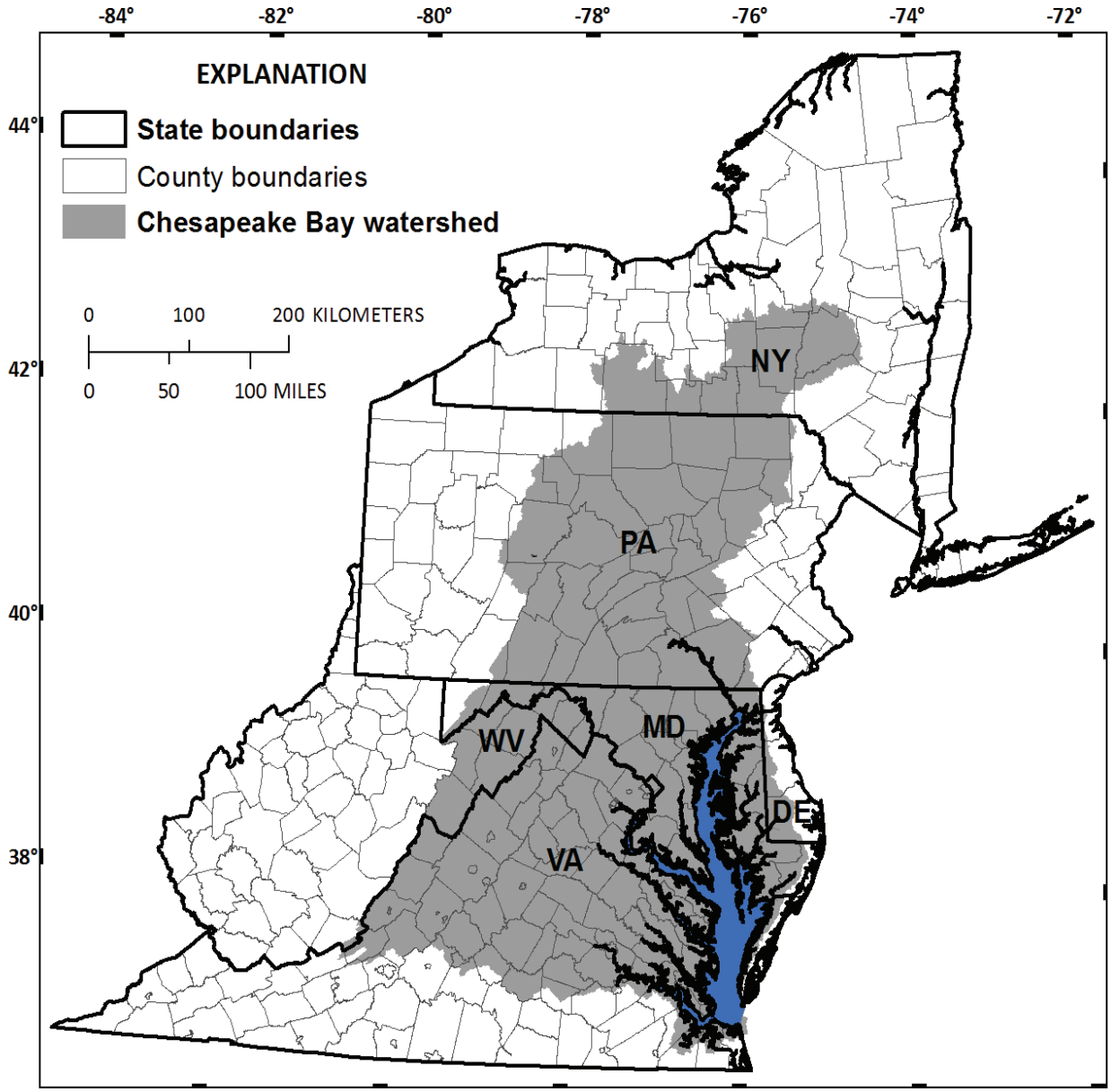

Figure 1. The Chesapeake Bay watershed (gray) with State jurisdictional borders (heavy black lines), and county boundaries (light black lines). The Chesapeake Bay watershed boundary is derived from the Chesapeake Bay Program Partnership's Watershed Model version 5.3.

Program Partnership (CBP Partnership) for use in the CBP Partnership's Chesapeake Bay Watershed Model. Although the jurisdictions have reported annual progress since the 1990s (U.S. Environmental Protection Agency, 2010, p. 1–4), this reporting has come under additional scrutiny since 2010, when the EPA issued the Chesapeake Bay Total Maximum Daily Load (TMDL) allocations for nitrogen, phosphorus, and sediment (U.S. Environmental Protection Agency, 2010, p. 1–4). The CBP Partnership's Annual Progress Review is used to assess to what extent the Chesapeake Bay watershed jurisdictions are making progress towards meeting their respective set of watershed nutrient and sediment pollutant load allocations. Each jurisdiction reports annual progress (July 1 to June 30) in implementation of conservation practices and treatment technologies for all pollutant source sectors: urban stormwater, wastewater, septic systems, air emissions, forestry, and agriculture. The CBP Partnership is working to ensure that the jurisdictions develop methodologies to reduce potential overcounting of agricultural conservation practices, such as removing previously reported practices that have expired and are no longer achieving the nutrient/sediment reduction benefits described in the model and removing previously reported practices that were on agricultural lands that have

been converted to another land use. This report focuses on the agricultural conservation practices that are promoted by the USDA.

Concern was expressed by the agricultural community that nutrient and sediment load reductions were not being fully reported by the Chesapeake Bay watershed jurisdictions nor fully credited in the Annual Progress Review, owing to lack of consistent access to USDA conservation practice implementation data and to reporting inconsistencies among the six State jurisdictions. This concern was expressed in multiple Chesapeake Bay Program Partnership meetings, including the Watershed Technical Workgroup *(http://www.chesapeakebay.net/groups/group/watershed_technical_workgroup)* and the Water-quality Goal Implementation Team (*http://www.chesapeakebay.net/groups/group/water_quality_goal_implementation_team*).

The U.S. Geological Survey (USGS) took on the task of acquiring, assessing, and evaluating agricultural conservation practice data records for USDA programs and transferring those datasets in aggregated format to State jurisdictional agencies for use in reporting conservation progress to the CBP Partnership. The USGS role was to pilot this work, resolve issues, and set a foundation for future tracking and reporting of USDA practices by the jurisdictions. Accordingly, in 2010, the USGS was established as a USDA 1619 Conservation Cooperator through agreements (appendix B:7, 8) signed with the USDA Natural Resources Conservation Service (NRCS) and the USDA Farm Service Agency (FSA). This status as a cooperator has allowed USGS staff to obtain and handle, in aggregate, Federal farmland conservation data records that are privacy protected as required by Section 1619 of the Food, Conservation, and Energy Act of 2008 (2008 Farm Bill).

The USGS acquired and processed USDA conservation data for the 2012 reporting period (July 1, 2011, to June 30, 2012). The USDA data came from two sources: the FSA and the NRCS. A methodology was developed to request and acquire the USDA conservation practice datasets, clean them to remove internal duplication, aggregate the data to protect farmer privacy, and transfer the data to the jurisdictions. The jurisdictions then chose whether to use these data directly in conservation reporting (DE, PA, WV), or to use existing jurisdictional 1619 agreements to obtain a parallel USDA dataset from local sources (MD, NY, VA). In either case, the six jurisdictions implemented protocols for removing potential duplicate counting of practices that are co-funded by the USDA and the jurisdictions, summarized the practice records by county and practice type, and submitted the aggregated totals to the Annual Progress Review via their respective State National Environmental Information Exchange Network (NEIEN) data transfer nodes. From there, the data were processed through the CBP Partnership's "Scenario Builder" module, where they were translated into CBP Partnership best management practice definitions and credited within the CBP Partnership's Phase 5.3.2.Watershed Model.

A similar tracking, reporting, and assessment will occur in future years as State and Federal governments and nongovernmental organizations continue to work with farmers and conservation districts to reduce the impacts of agriculture on local and Chesapeake Bay water-quality (Chesapeake Bay Program Watershed Technical Workgroup, 2013). The USGS is providing only short-term assistance with obtaining and aggregating USDA conservation practice data, and the USGS-USDA 1619 Conservation Cooperator Agreements are set to expire in 2015. This report discusses the reporting of conservation practices that reduce nutrient and sediment loads from agricultural land. Washington, D.C., is not attributed with agricultural land, so it was not included in this analysis.

Purpose and Scope

This project was initiated to provide consistency and completeness in reporting of USDA-sponsored agricultural conservation practices among the six Chesapeake Bay watershed jurisdictions with agricultural lands. The USDA engaged the USGS to act as a facilitator and use its expertise to acquire and process conservation data from the NRCS and FSA. As an impartial scientific third party, the USGS was able to play a key role in facilitating communication and data transfer (fig. 2) among the agencies responsible for implementation of Federal conservation programs (NRCS and FSA), the six watershed jurisdictions (DE, MD, NY, PA, VA, and WV), and the organizations responsible for tracking progress towards attaining TMDL conservation goals (EPA and CBP Partnership). Key contacts within each of these agencies were documented (Appendix A).This work was made possible by the signing of 1619 Conservation Cooperator Agreements between the USGS and USDA agencies (FSA and NRCS) that allowed access to Federal conservation data while ensuring the privacy of farmers as mandated under Section 1619 of the 2008 Farm Bill (appendix B:7,8). These USGS-USDA 1619 Conservation Cooperator Agreements will expire in 2015.

The objectives of the project were the following:

- Provide the six watershed jurisdictions with a consistent dataset of USDA financially assisted agricultural conservation practices implemented by NRCS and FSA throughout the Chesapeake Bay watershed jurisdictions, along with consistent definitions for agricultural conservation practices.
- Document the various methods used by the six watershed jurisdictions to obtain agricultural conservation data and address double counting where financial assistance was jointly provided through Federal and State programs.

- Provide a "crosswalk" document that translates between USDA conservation practice codes and the Chesapeake Bay Program Partnership's approved practice definitions.
- Streamline the overall tracking and reporting process to reduce the workload for the jurisdictions.
- Document and improve existing protocols to support ongoing adaptive management of conservation practice data reporting for Chesapeake Bay watershed agricultural lands and operations.
- The project was designed for USGS to provide short-term leadership in clarifying methods, providing datasets, and resolving issues, to assist the jurisdictions in developing their capacity for full integration of USDA and jurisdictional conservation datasets.

The first step in assisting with the reporting of USDA conservation practices was obtaining a comprehensive dataset. Each conservation record comprises a unique practice implementation on a single farm or field and is associated with a practice code, amount applied, and a considerable variety of detailed information regarding the practice location and characteristics. To determine what data were required, the USGS discussed with each jurisdiction the nature of potential duplication between the jurisdiction's data and USDA data. Once potential areas of duplicate reporting for each jurisdiction were identified, a list of USDA information that would be useful in identifying and eliminating double counting was compiled. This list was added to the list of information that was necessary to achieve accurate reporting of conservation practices and to support linkage to each jurisdiction's National Environmental Information Exchange Network (NEIEN) data interface and the Chesapeake Bay Program Partnership's "Scenario Builder" that is used to account for and credit conservation practices. Separate data requests for conservation practice information (appendix C) were designed and submitted to contact personnel (appendix A) at the FSA and at the NRCS.

Data were obtained in this manner for all farms within the Chesapeake Bay watershed that participate in USDA conservation programs. This method provided a consistent dataset covering all six watershed jurisdictions. The USDA conservation databases are complex, and different data requests can yield somewhat different information, depending on the timing and wording of the request. Use of a single clear and documented protocol to provide data for all jurisdictions led to a streamlined process, further ensuring consistency and transparency among the jurisdictions and ensuring a more complete, comprehensive accounting of implemented conservation practices.

Subsequent data processing steps were designed and documented to ensure consistency, accuracy, and the ability to replicate the data extraction and processing in future years. Much of the data processing included removal of duplicate data. In addition, data aggregation was performed to protect individual farmer privacy to ensure compliance with Section 1619 of the 2008 Farm Bill. The methodology was developed through ongoing conversation with the six watershed jurisdictions, USDA agencies, and the larger Chesapeake Bay Program Partnership.

From this dialogue, jurisdiction-specific methods for incorporating USDA conservation data into the CBP Partnership's Annual Progress Review process were developed and documented. Three of the jurisdictions (PA, DE, and WV) chose to use the USGS-provided dataset for reporting USDA conservation practices to the Annual Progress Review. The other three jurisdictions (MD, NY, and VA) chose to use locally sourced USDA data obtained via their jurisdictional USDA 1619 Conservation Cooperator Agreements (appendix B:1-6) but to employ the USGS-provided data to validate the jurisdictional datasets that they used to track both Federal and State conservation practices.

Tools that the USGS has provided to the six Chesapeake Bay watershed jurisdictions to facilitate their reporting of USDA agricultural conservation data include the following:

- A consistent and complete database of FSA and NRCS conservation practices implemented within the Chesapeake Bay watershed, in both unaggregated and aggregated format (delivered to the jurisdictions).
- A listing of useful information that can be obtained from the USDA conservation databases, including a list of available data attributes (appendix D).
- A crosswalk between USDA practice codes and conservation practice categories used by the CBP Partnership (appendix E).
- A USDA-approved methodology for data aggregation to protect confidential farmer information (appendix B: 9).
- Documentation of State-specific methods used in removing duplicate information records for practices that received financial assistance by both a jurisdiction and the USDA (in "Protocols for Avoiding Double Counting," below).
- A review of existing language for 1619 Conservation Cooperator Agreements along with FSA-recommended language suitable to obtain consistent and comprehensive access to USDA conservation data throughout the Chesapeake Bay jurisdictions (appendix B).

The methods employed in 2012 are documented here and shared with each watershed jurisdiction so that they may report USDA conservation data more easily, accurately, and completely in future years. The USGS is providing only short-term assistance with obtaining and aggregating USDA conservation practice data, and the USGS-USDA 1619 Conservation Cooperator Agreements are set to expire in 2015.

It should be emphasized that the primary purpose of gaining complete access to Federal, State, and private agricultural conservation implementation data is to give the jurisdictions a greater capacity for analysis and understanding of agricultural conservation practice implementation across the landscape, to support the adaptive management and targeting of conservation programs, fully credit producers for their implemented conservation practices, and promote success in attaining water-quality goals. The reporting aspect is also important because it will assist the jurisdictions in coordinating the development of knowledge to understand and document progress toward water-quality goals.

Data Confidentiality: USDA 1619 Conservation Cooperator Agreements

The conservation assistance that is provided to farmers by the USDA is authorized under the 2008 Farm Bill, and Section 1619 of that bill (appendix B: 1-8) states that, "USDA, or any contractor or cooperator of USDA, shall not disclose information provided by an agricultural producer or owner of agricultural land concerning the agricultural operation, farming or conservation practices, or the land itself, in order to participate in the programs of the Department . . ," except to agencies and individuals that have been established as USDA 1619 Conservation Cooperators. This means that information that is used by a farmer to enroll in Federal agricultural programs is defined as confidential between the farmer and the Federal Government.

Organizations can be established as 1619 Conservation Cooperators if they agree to maintain data confidentiality and if their use of the data provides technical or financial assistance to USDA conservation programs. Signing a 1619 Conservation Cooperator Agreement provides the cooperator with confidential access to the USDA's datasets of conservation practice information. The data can be released to the public if they are aggregated so that farmer privacy is protected, as discussed below. These 1619 aggregation requirements are regularly followed by USDA agencies such as the National Agricultural Statistics Service when they are publishing county statistics. Farmers can also release their site-specific data on an individual basis.

The 1619 Conservation Cooperator Agreements can be authorized by State and regional officials of the NRCS or FSA. Ultimately, responsibility for enforcing Section 1619 of the 2008 Farm Bill lies with the FSA, and at the national level the FSA Privacy Officer (John Underwood, appendix A) has authority to review and approve 1619 Conservation Cooperator Agreements for both the FSA and NRCS, and to sign for the FSA. Because the NRCS collaborates closely with is sister agency in delivering conservation services, and NRCS planners have access to the FSA Common Land Unit field boundary dataset, the NRCS agreements tend to specify that they apply to both NRCS and FSA conservation information. Therefore, jurisdictional agencies do not necessarily have to sign agreements with the FSA to gain access to FSA-managed conservation datasets, which include geospatial Common Land Unit (CLU) field boundaries as well as Conservation Reserve Program (CRP) and Conservation Reserve Enhancement Program (CREP) practices. The most comprehensive authorization option is to obtain signatures from both NRCS and FSA officials (see suggested language in appendix B:10). The agreements have start and end dates in most cases. The presence of an end date depends on the preference of the USDA signing official. Agreements may be amended by mutual agreement of all parties with signatory authority.

Section 1619 Agreements: Existing Language in the Jurisdictions

Four jurisdictions currently have established USDA 1619 Conservation Cooperator Agreements between the NRCS and one or more of their State conservation agencies (MD, NY, VA, and WV). The remaining jurisdictions (DE and PA) have not yet established conservation cooperator status for any of their conservation agencies. The agreements state that "Those individuals or organizations (governmental or nongovernmental) that assist the NRCS with providing conservation related services are known as NRCS Conservation Cooperators."

The following State agencies have established 1619 Conservation Cooperator Agreements with the USDA (table 1, appendix B:1-5) for the purpose of providing privacy-protected access to USDA conservation data:

- Maryland: Maryland Department of Agriculture (MDA)
- New York: Upper Susquehanna Coalition (USC)
- Virginia: Virginia Department of Conservation and Recreation (VA-DCR)
- West Virginia: West Virginia Department of Agriculture (WVDA)

- West Virginia: West Virginia Conservation Agency (WVCA)

These existing jurisdictional 1619 agreements (appendix B:1-5) are fairly consistent, but they differ in the wording of several key factors as described below. As a result, there are some important differences in the level of data access provided by the agreements, with some jurisdictions including a broader array of programs and practices than others (table 1). The broadest language for each of the key factors, which will ensure full access to all USDA conservation practice data, is printed below in *italics*. It should be mentioned that, despite differences in language, the effective interpretation of the agreements by the NRCS has been fairly broad and uniform, and was sufficient to provide full access to USDA data by the signatory jurisdictions in 2012.

Purpose: The agreements with Maryland, New York, and West Virginia all begin by stating that each of the State signatory agencies *"assists NRCS in the delivery of conservation-related services (for example: services that sustain agricultural productivity, improve environmental quality, reduce soil erosion, enhance water supplies, improve water-quality, increase wildlife habitat, and reduce damage caused by floods and other natural disasters) or with monitoring, assessing, or evaluating of conservation benefits from USDA conservation programs."* In Virginia, this language is reduced to the simplest NRCS Attachment C language (see appendix B:3): "provide technical and/or financial assistance for USDA conservation programs."

Limits: The simplest NRCS Attachment C language, which is used by New York and West Virginia, establishes that data access is limited to information necessary to "provide conservation related services." The Maryland agreement expands the language regarding data access to include information required to *"provide conservation related services and perform monitoring, assessing, or evaluating of conservation benefits."* In Virginia, data access is limited to information "necessary for the delivery of technical and/or financial assistance for conservation programs," and goes on to list six authorized technical assistance activities, including "compliance and status reviews." End dates of the various agreements are listed in table 1.

Aggregation: In all four cases—MD, NY, VA, and WV—the 1619 agreements establish that disclosure of protected information is allowed if *"the information has been transformed to statistical aggregate form without naming any owner, operator, producer, or data gathering site."* In most jurisdictional agreements this language is stated explicitly, whereas for Virginia (see appendix B:3) it is established via reference to "Section 1619 Attachment 1." The agreements state that the 1619 Conservation Cooperators must consult with the NRCS as to whether the data are appropriately aggregated prior to releasing information.

Data: The existing 1619 agreements do not limit the types of data that are being made available but do list example types of "prohibited information," including all attributes for Common Land Units (CLUs) in the USDA's Geospatial Information System. The existing agreements are interpreted by the FSA Privacy Officer John Underwood (appendix A) as providing access to NRCS practice data along with CLU field boundaries and FSA CRP and CREP practice data. The broadest language currently recommended by the FSA Privacy Officer would read: *"The protected data types approved for disclosure are limited to: Fully attributed conservation practice tabular numerical and text data and geospatial information depicting NRCS and FSA conservation practices and Common Land Unit (CLU) data for the State of {state name}. The geospatial information provided will not include any producer/owner Personally Identifiable Information (PII)."*

Privacy: The agreements with Maryland and West Virginia explicitly state that *Section 1619 supersedes State "sunshine laws," "open records acts,"* and *"the Freedom of Information Act."* Jurisdictions with laws stating that State acts supersede the Federal privacy regulations are not permitted to sign 1619 Conservation Cooperator Agreements.

Access: Typically, the agreement language states that Conservation Cooperators may obtain USDA conservation data from the NRCS or directly from farmers. The USGS agreements (see below) also state that *data can be obtained from other 1619 Conservation Cooperators.* However, the horizontal data transfer among States is not a desired functionality within State-specific 1619 data-sharing agreements. In Virginia, the 1619 agreement (appendix B:3) was signed by a specific individual within the Department of Conservation and Recreation who had responsibility for the Annual Progress Review, and data access was therefore limited to that person. This was interpreted by the FSA Privacy Officer to also include his successor in that job posting. Because the 1619 agreements can be amended through mutual consent, additional individuals within an agency may be added to such limited agreements upon approval by USDA.

USGS Section 1619 Agreements for the Chesapeake Bay Watershed

The USGS was established as a USDA 1619 Conservation Cooperator in 2010, under separate agreements with the FSA ("Cooperative Agreement," appendix B:6) and the NRCS ("Cooperative Interagency Agreement," appendix B:7). These agreements contain particular language developed to support the broad USGS objective of facilitating jurisdictional access to agricultural conservation practice data for the Chesapeake Bay watershed.

Purpose: The agreements state that the USGS is *"providing technical or financial assistance under a USDA program that concerns an agricultural operation, agricultural land, farming practice, or conservation practice."*

Limits: The USGS is authorized to use the Federal conservation data in aggregate "to provide technical assistance, in the form of monitoring, assessment, and evaluation, of USDA Farm Bill Programs…by analyzing the impact of farming practices on water-quality in the Chesapeake Bay watershed."

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Aggregation: The 1619 agreements authorize the USGS to "release aggregated statistical information to Chesapeake Bay Program partner organizations and the public following review and approval by USDA of data aggregation procedures to ensure compliance with Section 1619." This wording allowed the USDA to approve the overall aggregation protocol rather than each aggregated data product (for example, conservation practice data aggregated to the county scale, throughout the Chesapeake Bay watershed). A data-handling procedure was developed by the USGS and approved by the USDA (appendix B:8), establishing that aggregate data for each particular conservation practice could be released to the public if five or more farm owner/operators were participating in a particular conservation practice within the aggregated area.

Access: Through its 1619 agreements, the USGS was authorized to receive USDA data from the FSA, NRCS, individual farmers, or from other 1619 Conservation Cooperators. Through additional and explicit approval (appendix B:9) from the FSA Privacy Officer, the USGS was also authorized to transmit USDA data to specific 1619 Conservation Cooperators (the jurisdictional agencies with 1619 agreements in place).

Although some labor was involved in reconciling the wording of the various 1619 agreements and in receiving permissions to share data between the USGS and the State agencies, the four jurisdictional agencies with 1619 Conservation Cooperator Agreements in place (MD, NY, VA, and WV) were ultimately given access to the unaggregated (site-specific) USDA agricultural conservation practice data that were compiled by the USGS in 2012. In the case of the Virginia Department of Conservation and Recreation (VA-DCR), owing to the wording of its 1619 agreement, this access was limited to two key individuals (Bill Keeling and Lawrence Fender, appendix A).

APPENDIX F

Table 1. Status of 1619 Conservation Cooperator Agreements for each Chesapeake Bay jurisdiction. These agreements facilitate access to USDA agricultural conservation data on a privacy protected basis. See page vii in text for agency abbreviations. Two jurisdictions (Delaware and Pennsylvania) do not currently have 1619 agreements in place.

Jurisdiction	Agency	Purpose	Limits	Data covered	Start date	End date
Maryland	MDA	Assist NRCS in the delivery of conservation-related services.	Provide conservation-related services; monitor, assess, evaluate conservation benefits.	Not limited; lists specific data that may be viewed.	10/27/2009	None
New York	USC	Assist NRCS in the delivery of conservation-related services.	Provide conservation related services.	Not limited; lists specific data that may be viewed.	3/3/2011	None
Virginia	DCR	Provide technical assistance for USDA conservation programs.	Lists authorized activities including "compliance and status reviews."	Not limited; lists specific data that may be viewed.	12/4/2009	None
West Virginia	DA	Assist NRCS in the delivery of conservation-related services.	Provide conservation-related services.	Not limited; lists specific data that may be viewed.	4/7/2012	None
West Virginia	CA	Collect data to document and verify practices.	WV animal operations in the Potomac Basin.	Animal waste management and mortality disposal systems.	2/21/2012	3/1/2013
Federal	USGS	Provide technical assistance for a USDA program.	Monitoring, assessment, and evaluation; impact of farming practices on water-quality in the Chesapeake Bay watershed.	CRP and CREP, field boundaries, for States in Chesapeake Bay.	8/2/2010	9/30/2015
Federal	USGS	Provide technical assistance for a USDA program.	Monitoring, assessment, and evaluation; impact of farming practices on water-quality in the Chesapeake Bay watershed.	Farm Bill programs.	11/20/2010	9/30/2015

Data Access for the Chesapeake Bay Program Partnership's Annual Progress Review

Each of the jurisdictions has identified a key State agency with responsibility for submitting aggregated agricultural conservation practice data to the CBP Partnership's Annual Progress Review, through their respective State's NEIEN data transfer node (table 2). These agencies work in partnership with additional jurisdictional and Federal agencies to collect and compile the necessary conservation practice implementation data, often funded in the process by the EPA's Chesapeake Bay Regulatory and Accountability Program Grants (CBRAP) to the jurisdictions.

In 2012, the USGS provided three of the Chesapeake Bay jurisdictions (DE, PA, and WV) with a database of USDA conservation practice implementation records that were aggregated by county, suitable for public release. This aggregation meets the 1619 requirements that protect agricultural producer identity. Specifically, practice implementation is only reported in aggregate form if five or more producers implemented the practice in a particular geographic area. Those data were integrated with the jurisdictional records of State-funded practices and submitted to the CBP Partnership's Annual Progress Review by each State through the respective State NEIEN node. The remaining three jurisdictions (MD, NY, and VA) had 1619 Conservation Cooperator Agreements in place and chose to obtain USDA conservation data directly from the USDA and jurisdictional databases, without using the USGS-provided dataset.

Delaware

In Delaware, the Department of Natural Resources and Environmental Control (DE-DNREC) has full responsibility for reporting practices to the EPA for use in the CBP Partnership's Annual Progress Review, including data submission through Delaware's State NEIEN node. Because Delaware does not have a 1619 data sharing agreement in place, in 2012 they relied upon the USGS to provide an aggregated dataset of USDA conservation practices, which was then integrated with jurisdictional records of State financially assisted agricultural conservation practices and urban stormwater, onsite treatment systems, and wastewater practices. The USDA data used in previous years were acquired from the Delaware State NRCS Office in an aggregated format.

Maryland

In Maryland, the Department of Agriculture (MDA) has been established as a 1619 Conservation Cooperator with the NRCS (appendix B:1). Supported by this jurisdictional 1619 data-sharing agreement, Maryland has developed an integrated "Conservation Tracker" database that is used within each Conservation District office to document Federal, State, and nongovernmental organizations' financial assistance and conservation practices installed without Federal or State financial assistance. This database has made it comparatively easy for Maryland to eliminate double counting and accurately report conservation practice implementation. The MDA compiles and aggregates the Conservation Tracker dataset; joins the resulting data with additional jurisdictional databases documenting cover crops, manure transport, and nutrient management; and then transmits the aggregated data to the Maryland Department of the Environment (MDE), which is the lead Maryland agency for operation and maintenance of Maryland's State NEIEN node.

New York

In New York, the Upper Susquehanna Coalition (USC) has been established as a 1619 Conservation Cooperator with the NRCS (appendix B:2). The USC is made up of various collaborators within the Soil and Water Conservation Districts serving the area of New York in the Chesapeake Bay watershed and currently has full responsibility for reporting practices for the CBP Partnership's Annual Progress Review, including data submission through the New York's State NEIEN node. Because the portion of New York that falls within the Chesapeake Bay watershed is relatively small (comprising 16 Soil and Water Conservation Districts), the USC has established a method of meeting with each of its member Soil and Water Conservation Districts to obtain annual conservation implementation data. During this process, the USC also collects information on practice implementation from partners such as the NRCS and Cornell Cooperative Extension.

The USC's Soil and Water Conservation Districts organize conservation data within the New York's Agricultural Environmental Management (NY-AEM) framework that they use to track both State and federally financed conservation practices. The NY-AEM is part of the overall Agricultural Environmental Management umbrella, which, by State law, partners the New York State (NYS) Department of Agriculture and Markets, the NYS Soil and Water Conservation Committee, and the Soil and Water Conservation Districts in a multifaceted program for conservation on farms. Within this framework the USC has developed an online tool to record and report State and federally financed conservation practices. Although the NY-AEM online tool was not used for progress reporting in 2012, it has the potential to make it comparatively easy for the USC to eliminate double counting and accurately and consistently report conservation practice implementation for the CBP Partnership's Annual Progress Review. In 2013, responsibility for operation and maintenance of New York's State NEIEN node (in terms of submission of annual Chesapeake Bay watershed agricultural conservation practice data) is in the process of being transferred from the USC to the NYS Department of Environmental Conservation (NY-DEC).

Pennsylvania

In Pennsylvania, the Department of Environmental Protection (PA-DEP) has responsibility for reporting practices for the CBP Partnership's Annual Progress Review, including data submission through Pennsylvania's State NEIEN node. Because this agency does not have a 1619 agreement in place, in 2012 Pennsylvania relied upon the USGS to provide an aggregated dataset of USDA conservation practices, which was then integrated with the jurisdictional spreadsheet of State-funded practices.

Virginia

In Virginia, the Department of Conservation and Recreation (VA-DCR) has been established as a 1619 Conservation Cooperator with the NRCS (appendix B:3) and has full responsibility for reporting practices, including data submission to the

CBP Partnership's Annual Progress Review. The Virginia 1619 agreement limits data access to the specific individual within VA-DCR that is responsible for the Annual Progress Review. Because the VA-DCR does not have an integrated Federal-State data tracking system, this person obtains USDA conservation practice data by requesting them from the Virginia State NRCS office, where the data are compiled by querying the NRCS Integrated Data for Enterprise Analysis (IDEA) database. This dataset is then integrated with the jurisdictional database of State-funded practices and the data are aggregated prior to submission to the Annual Progress Review by using node client software for reporting extensible markup language files. In 2013, responsibility for the Annual Progress Review data submission is shifting from the VA-DCR to the Virginia Department of Environmental Quality (VA-DEQ), and there is currently no 1619 agreement in place for that agency.

West Virginia

In West Virginia, the Department of Agriculture (WVDA) has been established as a 1619 Conservation Cooperator with the NRCS (appendix B:4) but cannot share unaggregated conservation practice information with the Department of Environmental Protection (WVDEP), which is the agency responsible for submitting data through West Virginia's State NEIEN node. The West Virginia Conservation Agency (WVCA) was also established as a cooperator with the NRCS under a memorandum of understanding covering only animal waste disposal and poultry mortality disposal in the Potomac Basin (appendix B:5). That agreement was recently renewed. Although West Virginia is a 1619 Conservation Cooperator (via the WVDA and WVCA), NRCS staffing and priorities led the WVDEP to rely upon the USGS to provide an aggregated dataset of 2012 USDA conservation practices, which was then integrated with the jurisdictional database of State-funded practices and submitted through West Virginia's State NEIEN node.

Interestingly, the two jurisdictions with the most comprehensive 1619 agreements (MD and NY) have established jurisdictional integrated databases of Federal and State-sponsored agricultural conservation practices. This allows these States to directly track cost-shared conservation practices regardless of the source of financial assistance (State, Federal, or private) and address the removal of double counting in a relatively straightforward manner. It also has greatly simplified their annual reporting to the CBP Partnership's Annual Progress Review. These results imply that Virginia might benefit from establishing a combined jurisdictional database of Federal and State practices. Currently, Virginia has a labor-intensive data submission process, owing to the State's use of record-by-record comparison for removal of double-counted practices, as described below.

Establishing new 1619 Conservation Cooperator Agreements

The following jurisdictional agencies with responsibility for conservation data reporting do *not* currently have 1619 Conservation Cooperator Agreements in place and must rely upon obtaining aggregated conservation data from their collaborators:

- *Delaware Department of Natural Resources and Environmental Control (DE-DNREC).*—Receives aggregated conservation practice data from the conservation districts and the USGS, and submits the data to the CBP Partnership's Annual Progress Review through the Delaware NEIEN node.
- *Maryland Department of the Environment (MDE).*—Receives aggregated conservation practice data from Maryland Department of Agriculture and submits the data to the CBP Partnership's Annual Progress Review through the Maryland State NEIEN node.
- *New York Department of Environmental Conservation (NY-DEC).*—Will be assuming responsibility for submission of data to the New York NEIEN node, working in partnership with the Upper Susquehanna Coalition.
- *Pennsylvania Department of Environmental Protection (PA-DEP).*—Receives aggregated conservation data from conservation program leads, conservation districts, and the USGS, and submits the data for the CBP Partnership's Annual Progress Review through Pennsylvania's State NEIEN node. The Department of Environmental Protection is the Pennsylvania State agency with direct responsibilities for planning, funding, delivery, reporting, and submission of conservation-practice data. In addition to providing conservation services, it is also a regulatory agency.
- *Virginia Department of Environmental Quality (VA-DEQ).*—Is assuming responsibility for the Annual Progress Review from the VA-DCR, and a number of conservation programs are also in the process of being transitioned from the VA-DCR to VA-DEQ following recently enacted legislation. The implications for 1619 data access in Virginia are currently unclear, pending final transition of programmatic responsibilities between the two agencies.
- *West Virginia Department of Environmental Protection (WVDEP).*—Receives aggregated conservation data from the West Virginia Department of Agriculture, the West Virginia Conservation Agency, and the USGS, and submits the data for the CBP Partnership's Annual Progress Review through West Virginia's State NEIEN node.

APPENDIX F

Several additional agencies that are directly involved in conservation planning, funding, delivery, and reporting of conservation-practice data also do not have 1619 data-sharing agreements in place:

- *Delaware Department of Agriculture (DE-DA).*—Currently provides aggregated jurisdictional records to the DE-DNREC for use in reporting to the CBP Partnership's Annual Progress Review.
- *Delaware Forest Service (DE-FS).*—Promotes forestry conservation practices with USDA financial assistance.
- *Pennsylvania Department of Agriculture (PA-DA).*—Promotes conservation practices in collaboration with the USDA and PA-DEP.
- *West Virginia Conservation Agency (WVCA).*—Has established a 1619 agreement covering animal waste and mortality data only. The agency currently provides aggregated conservation data to the WVDEP.

In support of the NRCS Chesapeake Bay Watershed Initiative (CBWI), the NRCS has encouraged jurisdictional conservation agencies that do not have 1619 agreements in place to request to establish one (Rich Sims, appendix A). Each of the jurisdictional agencies listed in table 2 has been vetted and approved by the FSA Privacy Officer, in collaboration with the NRCS regional conservationists, as eligible for USDA 1619 Conservation Cooperator status because the agency supplies conservation technical assistance to NRCS programs under the definitions established by the NRCS Chesapeake Bay Watershed Initiative (*http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/programs/farmbill/?cid=stelprdb1047323*).

This list does contain State regulatory agencies including the DE-DNREC, MDE, NY-DEC, PA-DEP, VA-DEQ, and WV-DEP, although most of these agencies also have direct responsibility for planning, funding, and implementation of conservation practices and provide conservation technical assistance to farmers. Several of the NRCS State Conservationists in the Chesapeake Bay have stated that 1619 agreements will not be provided to regulatory agencies. However, it is possible to word 1619 agreements to specifically limit access to the few key individuals within those agencies who are responsible for conservation data reporting (see suggested language in appendix B:10). For example, at the USGS only employees who have signed an internal 1619 data-handling agreement with specific data-use objectives (appendix B:8) are allowed access to the protected conservation dataset. A similar strategy could be used by the jurisdictional agencies to maintain a firewall between regulation and conservation implementation/reporting while still allowing critical staff access to the USDA dataset to assist in jurisdictional conservation reporting and management.

Table 2. State jurisdictional agencies that have been approved by the USDA for participation in 1619 data-sharing agreements to support the objectives of the NRCS Chesapeake Bay Watershed Initiative and increase the capacity for consistent, integrated analysis and reporting of conservation practice implementation data for the Chesapeake Bay watershed. See page vii of text for agency abbreviations.

Jurisdiction	Agency	Role	1619 agreement in place?
Delaware	DE-DNREC	Responsible for NEIEN submission.	No
	DE-DA	Provides conservation services.	No
	DE-FS	Provides conservation services.	No
Maryland	MDA	Provides conservation services.	Yes
	MDE	Responsible for NEIEN submission.	No
New York	USC	Provides conservation services.*	Yes
	NY-DEC	Responsible for 2013 NEIEN submission.	No
Pennsylvania	PA-DEP	Responsible for NEIEN submission.**	No
	PA-DA	Provides conservation services.	No
Virginia	VA-DCR	Provides conservation services.	Yes
	VA-DEQ	Responsible for NEIEN submission.	No

The development of a multi-organizational 1619 Conservation Cooperator Agreement to cover all relevant agencies was proposed to the CBP Partnership at the September 12, 2012, Best Management Practice (BMP) Verification Committee meeting (*http://www.chesapeakebay.net/calendar/event/18557/*). The proposal was well received by both the jurisdictions and other members of the BMP Verification Committee, and steps were taken to further explore the creation of a multi-organizational agreement as is evidenced in the minutes at the aforementioned meeting Web site.

A multi-organizational 1619 Conservation Cooperator Agreement could have several benefits, including the following:

- Simplification for USDA, USGS, and jurisdictional staff (one data request rather than many)
- Consistency of data (supporting uniform reporting throughout the Chesapeake Bay watershed)
- Increasing access to unaggregated, farm-specific data (to increase capacity for analysis of conservation implementation to support adaptive management of conservation programs)

However, on March 13, 2013 the CBP's Partnership's BMP Verification Committee decided " …not to pursue a single six-state 1619 agreement, but instead seeking all six states signing their own individual 1619 agreements with the NRCS and FSA. The bottom line objective remains the same: ensuring that all six states have full access only to all financially-assisted Federal conservation practice data to be used to eliminate any double counting, support effective conservation program implementation, and fully credit their producers for their nutrient and sediment load reduction implementation actions. The data are only released in aggregate form to protect the confidentiality of agricultural producers. The Committee agreed to recommend to the Partnership that the six states, the USDA, and other appropriate partners sign a cover page referencing the attached six state-specific 1619 agreements collectively ensure all six states have full access to Federal financially assisted practice data."

Establishing a comprehensive set of 1619 agreements for all relevant jurisdictional agencies could help to solve many technical details involved in obtaining accurate reporting of Federal and State progress in implementing agricultural conservation practices. The development of 1619 agreements between the USDA and the agencies listed in table 2 could greatly increase the capacity for integrated analysis and reporting of agricultural conservation implementation. Use of consistent, comprehensive language within the agreements, such as is documented in appendix B:10, could support the use of a single data request to obtain USDA data for all jurisdictions in the Chesapeake Bay watershed, which could streamline efforts and promote equity in conservation data reporting across the Chesapeake Bay watershed. This uniform dataset could be tailored to formats that integrate effectively within each State's respective conservation tracking and reporting system.

However it is achieved, whether agency-by-agency or through multi-organizational agreements, adopting consistent and thorough language for 1619 Conservation Cooperator Agreements for all relevant jurisdictional conservation agencies could greatly assist in meeting the objective of increasing capacity for analysis and understanding of implementation in support of adaptive management of conservation programs, as well as establishing consistency and accuracy among the jurisdictions in reporting of USDA conservation data for Chesapeake Bay agricultural lands.

In the absence of 1619 Conservation Cooperator status, the jurisdictional agencies can work to develop more effective, consistent, and well-documented methods of obtaining aggregated conservation data from collaborating agencies that are 1619 Conservation Cooperators, and smoothly integrating those data with jurisdictional datasets.

Data Collection and Processing

In 2012, the USGS obtained USDA conservation data for NRCS and FSA programs and provided these data to the six Chesapeake Bay jurisdictions to support their reporting of conservation practice implementation to the CBP Partnership's 2012 Annual Progress Review. The methods used are detailed in this report. The data collection and processing steps required of the USGS included

- obtaining the data from USDA agencies (NRCS, FSA),
- cleaning the USDA dataset to remove internal duplication,
- aggregation of data to ensure producer privacy,
- establishing a "crosswalk" document to translate between USDA and Chesapeake Bay Program Partnership approved practice definitions,
- transmittal of the data to each jurisdiction for use in the reporting process, and
- communication with each jurisdiction to establish and document solutions for avoiding double counting as the datasets are integrated.

The jurisdictions integrated USDA data with their State reporting systems, removed duplicate records, and delivered aggregated summaries of 2012 conservation practice implementation (new practices implemented between July 1, 2011, and June 30, 2012) to the CBP Partnership's Annual Progress Review. The jurisdictions report conservation data from all nutrient and sediment pollutant source sectors. For agriculture, depending on their preference, the jurisdictions can choose to report USDA

conservation practices either from the data provided by the USGS or from the jurisdiction's own data sources (site-specific data obtained from State NRCS offices under jurisdictional 1619 agreements, or aggregated totals received from the collaborating jurisdictional agencies that are responsible for practice implementation). The deadline for reporting 2012 data to the Annual Progress Review was December 31. However, the deadline for 2013 is December 1.

Implementing Agricultural Conservation Practices

A farmer may have a variety of reasons for choosing to adopt agricultural conservation practices, including regulation (for example, compliance with management requirements for highly erodible land or concentrated animal feeding operations), incentives (financial assistance for various practices), or stewardship. The typical flow of business begins with a field technical staff person working with a farmer to design and implement recommended conservation practices. The USDA Service Center offices that are found in nearly every county of the Nation are typically staffed by a mixture of employees working for the NRCS,

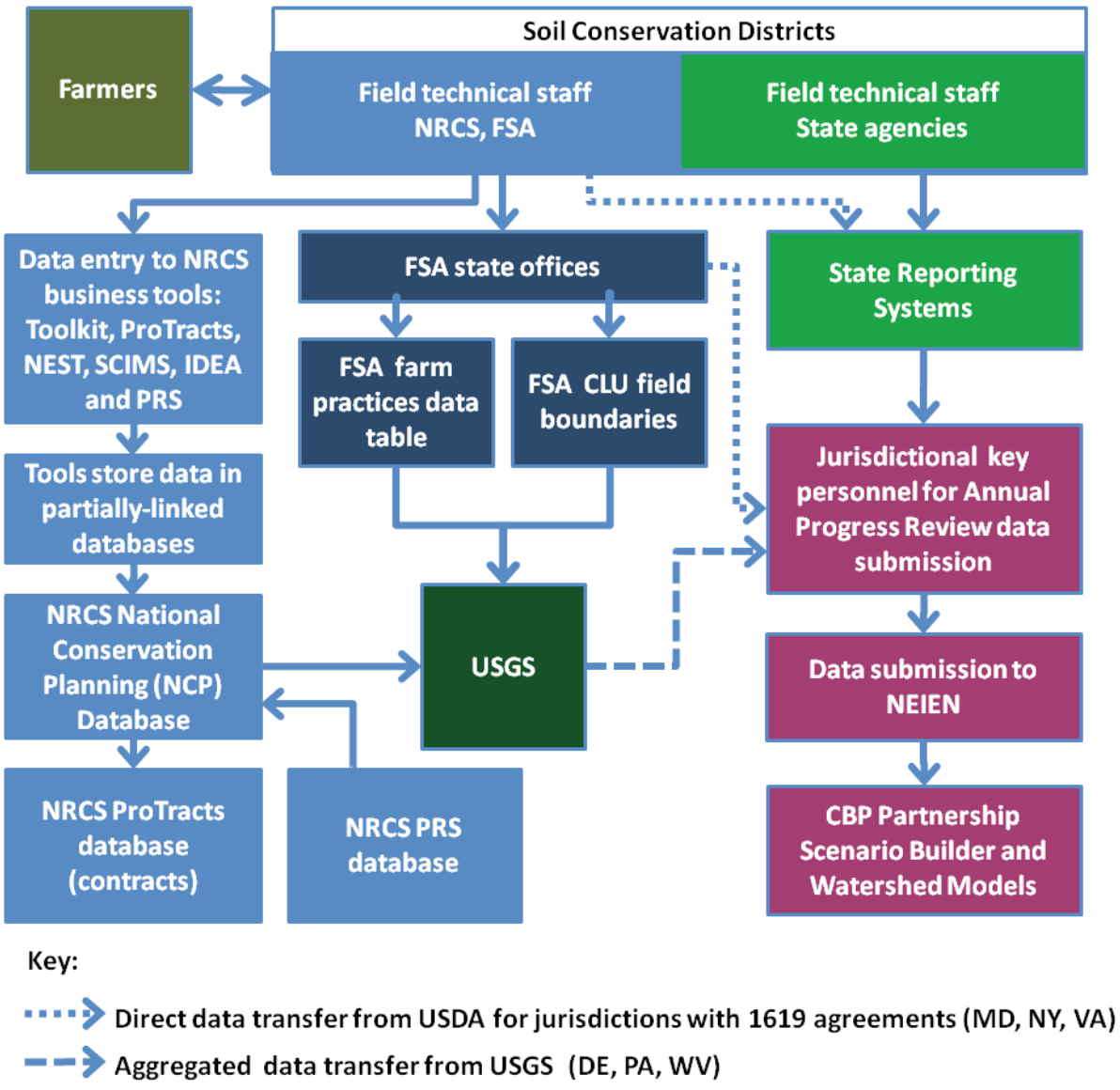

Figure 2. Flow diagram of USDA conservation data collection and reporting strategies. See page vii of text for abbreviations.

county conservation districts, and State conservation agencies. Additional conservation support can be provided by the FSA, university extension, private agricultural technical service providers, and nongovernmental organizations.

Once a practice or set of practices is chosen by the farmer, available funding sources may be determined. In some jurisdictions, and for some practices, financial assistance may be available only from USDA programs. Other jurisdictions may provide financial assistance for specific practices from State agencies, and private funds are sometimes available from sponsored programs. Additionally, farmers may cover a substantial portion of the cost. Funding availability is practice specific, and some practices are considered higher priority in certain locations and in certain years.

Conservation practices can be generally separated into two classes: structural practices, in which engineered improvements such as improved barnyards, stream crossings, manure storage structures, and filtration swales are expected to last for several to many years; and management practices such as cover crops and nutrient management, which are applied one growing season at a time. The NRCS will subsidize the management practices for 1 to 3 years, after which it is hoped that farmers will continue the practices on their own. Indeed, for most management practices, it is the NRCS perspective that funding is designed to help a farmer through the adoption phase for best management practices, after which the farmer will be prepared to continue the practice using only on-farm resources. The FSA conservation practices (funded under the CRP and the CREP) generally cover fencing, vegetative cover (grass, shrubs and trees), and set-asides of critical natural habitat and near-stream areas, with contracts lasting 10 years or more.

Once a farm owner/operator commits to implementing a conservation practice, funding is identified, the farmer is determined to be eligible for the program, then a contract is signed and the practice is implemented and inspected according to established guidelines. Depending on the source of funds, the pertinent information (farmer, contract, location, and practice details) is recorded into one or more jurisdictional and (or) USDA databases by an employee of the conservation district, the NRCS, and (or) FSA.

Documenting Agricultural Conservation Practices

For the FSA, conservation data records for new Conservation Reserve Program (CRP) and Conservation Reserve Enhancement Program (CREP) practices are collected on a monthly basis from county FSA offices, rolled up through FSA State coordinators, and reported to the Aerial Photography Field Office (*http://www.fsa.usda.gov/FSA/apfoapp?area=apfohome&subject=landing&topic=landing*). The records contain a practice code, applied date, and various implementation details and metrics.

For the NRCS, conservation data records are entered into integrated agency business tools and relational databases (fig. 2) by NRCS field office staff. The Conservation Toolkit planning information is stored in the National Conservation Planning (NCP) database, which contains progress/performance information for all NRCS conservation programs but does not include financial information. The NRCS customer data originate with the USDA Service Center Information Management System (SCIMS) data. Easement boundaries are stored in the National Easements Staging Tool (NEST). The NRCS ProTracts system is the repository for the financial contract information for the Environmental Quality Incentives Program (EQIP), Agricultural Water Enhancement Program (AWEP), Agricultural Management Assistance Program (AMAP), Wildlife Habitat Incentive Program (WHIP), and Conservation Stewardship Programs (CSP). Progress data are recorded primarily in the Performance Results System (PRS) database. The ProTracts data and PRS data are also linked to the NCP database to track common data. References describing several of these complex database systems can be obtained at

www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1045976.pdf .

For the purposes of this project, the data stored in the NCP database were most appropriate. This project worked with tabular data that were queried from the NCP database by David Butler (appendix A), at the NRCS Information Technology Center, in Fort Collins, Colorado. A similar (but not identical) dataset can also be obtained by using the Integrated Data for Enterprise Analysis (IDEA) interface that combines data from multiple NRCS software systems.

The jurisdictions also keep independent conservation tracking systems. Some jurisdictions, such as Maryland (Conservation Tracker database) and New York (Agricultural Environmental Management database), require all NRCS and FSA financially assisted practices to be entered into jurisdictional data tracking systems by Service Center Office staff, along with State-funded practices and practices for which the Service Center Office has provided conservation technical assistance without financial assistance. Other jurisdictions (DE, PA, VA, and WV) do not have statewide combined reporting and tracking systems. Most of these jurisdictions maintain conservation data tracking systems that partially overlap with USDA databases, depending on the particular practice. Discussion of processes employed to remove duplicate data follows in later sections.

Obtaining USDA Agricultural Conservation Practice Data

In 2010, 1619 Conservation Cooperator Agreements (appendix B:6,7) were signed between the USGS and USDA agencies (NRCS and FSA) allowing the USGS access to conservation data records for all farms in the Chesapeake Bay watershed. This

access was interpreted to include every county that intersects or falls within the Chesapeake Bay watershed boundary (fig. 1). Under the authority of these agreements, the USGS requested datasets from the FSA and NRCS, with the primary objective of obtaining data for practices implemented within the 2012 Progress Reporting Year (July 1, 2011, to June 30, 2012) and the secondary objective of obtaining as many recent years of quality data as were readily available. Considerable discussion with various State and Federal contacts (appendix A) was required in order to determine the specific information to be included in each data request.

FSA Data

The USGS requested data from the FSA on August 8, 2012 (appendix C:2). Updates to the national FSA databases are made monthly on a rolling basis, and the best timing to obtain a database of practices implemented through the end of the each progress year (June 30) is therefore to make the request after August 1, when the July monthly update has been completed. There is no particular benefit in waiting until the end of the Federal fiscal year (September 30) to make a data request.

The FSA data came from two parallel sources:

1. The FSA Farm Practices Dataset ("UnaggregatedFSAPracticeDataByState") was obtained on August 29, 2012, from Barbara J. Clark (appendix A) in the FSA Kansas City office. The dataset included two spreadsheets of information: Practices and Customers. The six critical information fields used for data reporting included county (FIPS), practice applied date (OriginalCRPStartDate), practice code (PracticeCode), acreage (PracticeAcres), customer (CustNo), and contract number (ContractID). The dataset included FSA financially assisted CRP and CREP practices applied on agricultural land within the six-State area, with records going back to 2000. The dataset did not include practices where Federal financial assistance was not provided.
   The FSA Farm Practices Dataset contained 1,212 records of practices that were applied between July 1, 2011, and June 30, 2012 (table 3) in counties that intersect or fall within the Chesapeake Bay watershed. The data were aggregated by county to protect farmer privacy, and the information was delivered to the State jurisdictions for possible use in conservation reporting. The number of reportable records by jurisdiction is presented in table 3. It was not necessary to use contract lifespan (YearContractEnd) to determine whether practices had expired because only new practice implementation was being tabulated for each of the past 3 years, rather than all practices under active contracts, and the minimum lifespan of a CRP or CREP contract is 10 years. See appendix D:1 for a listing of the FSA conservation practices that were contained in the dataset.

2. The FSA Geospatial Dataset, delivered by Dave Perry (appendix A), included annotated shapefiles of Common Land Use (CLU) field boundaries and a database file containing limited information on CRP and CREP enrollment for each county. This dataset included all existing practices but did not include a practice applied date. The CLU shapefiles can be linked to the FSA Farm Practices tabular dataset by using the unique identifier CLU_ID that is present in both datasets, providing geospatial locations for each practice. Apart from location, the practice information contained in the shapefiles is otherwise not as useful for conservation data reporting as is the tabular Farm Practices dataset. Because sub-county geospatial information was not required for the 2012 Annual Progress Review, the 2012 CLU geospatial dataset was archived and transmitted to USGS 1619 collaborators for use in watershed studies but was not used for reporting purposes.

APPENDIX F

Table 3. Number of USDA conservation practice records within each contract program, after removal of duplication between NRCS and FSA datasets (cleaned). These totals include all practices within counties that intersect or are contained within the Chesapeake Bay watershed and are for the 2012 progress year (July 1, 2011–June 30, 2012).

Conservation Program	DE	MD	NY	PA	VA	WV
Agricultural Management Assistance	32	130	42	144	0	24
Agricultural Water Enhancement Program	0	0	322	0	2	0
Chesapeake Bay Watershed Initiative	323	5,911	164	2,607	6,746	505
Conservation Reserve Program	70	628	45	147	396	5
Conservation Security Program	0	0	0	0	10	0
Conservation Stewardship Program	0	0	0	4	2	0
CTA - Great Lakes Restoration Initiative	0	0	1	6	0	0
DE-SL-District Cost-Share Program	3,433	9	0	0	0	0
DE-SL-District Cost-Share Funded	1,420	0	0	0	0	0
Emergency Conservation Program	0	0	0	0	34	12
Environmental Quality Incentive Program	1,032	3,036	2,385	2,845	2,482	1,195
Grassland Reserve Program	0	0	28	1	8	0
MD-CE-Grazing Lands Conservation Init	0	2	0	0	0	0
MD-SL-MACS CostShr or Prog Admin - CTA	0	119	0	0	0	0
MD-SL-MACS-EQIP Co-Costshare	0	59	0	0	0	0
MD-SL-MACS-WHIP Co-Costshare	0	7	0	0	0	0
MD-SL-MACSGLC	0	11	0	0	0	0
PA-CE-Tuplehocken Creek	0	0	0	1	0	0
Small Watershed Operations	0	0	0	49	0	0
VA-CE-Chesapeake Bay Activities	0	0	0	0	184	0
VA-RN-DCR	0	0	0	0	5	0
VA-RN-DCR/SWCD BMP	0	0	0	0	6	0
VA-SL-GLCI	0	0	0	0	11	0
VA-SL-US-CTA-VAAGBMP	0	0	0	0	32	0
Wetlands Reserve Program	4	8	29	11	16	2
Wildlife Habitat Incentives Program	25	49	305	273	395	259
WV-CE-Chesapeake Bay Program	0	0	0	0	0	48
FSA (CRP and CREP)	21	413	54	551	150	23
Total number of funded practices	6,360	10,382	3,375	6,639	10,479	2,073
Conservation Technical Assistance (CTA)*	531	16,110	3,049	6,310	15,569	1,165
% CTA	8%	61%	47%	49%	60%	36%

* CTA practices were not reported to the 2012 Annual Progress Review.

NRCS Data

The USGS received data from the NRCS on October 19, 2012, after the close of the Federal fiscal year (September 30). System updates occur at the end of each fiscal year, and the most complete dataset is available once those updates are complete. It is therefore most effective to acquire NRCS conservation data from the National Conservation Planning (NCP) dataset [fig. 2] after October 15 of each year. This requires beginning the paperwork for the data request several months prior (July), working in collaboration with a senior NRCS counterpart who will officially author the data request (this counterpart was Arlen Ricke in 2012 and Rich Sims in 2013, appendix A).

Although the data request can be simple (appendix C:3), it is important to identify the full range of desired Farm Bill contract programs to be included (table 3), and, because programs change from year to year, to specifically request ‘data for

all conservation practices located within the Chesapeake Bay watershed.' In 2012 it was sufficient to identify 'the full range of the NRCS Chesapeake Bay Watershed Initiative programs along with Conservation Technical Assistance,' but as databases are updated and change over time, it may become necessary to name the individual programs for which data are needed. The list of 2012 programs is included in table 3. Although it is not required in the formal data request, it is also critical to communicate the breadth of data categories being requested (appendix C:1) to the NRCS point of contact (David Butler, appendix A) in order to obtain sufficient information to adequately address double counting and accurately credit conservation practices within the Chesapeake Bay model. An updated 2013 data request specifying this information is included as appendix C:5.

In response to the 2012 request, the NRCS provided data back to 2006, the earliest year from which digital data management has been consistent. The key contact person who prepared and delivered the NRCS dataset was Dave Butler (appendix A). The data were delivered in a SQL Server database backup file. The database was organized into five tables: Practices, Plan Customers, Plan Agency Affiliation, Contracts, and Contract Customers (appendix C:1). Database operations were performed by using SQL Server. Each NRCS data record contained an identifier for the sponsoring program (contract program name). The number of records per program and State contained in the dataset is listed in table 3.

The data request was limited to applied practices, and it excluded practices that had been planned but not yet applied. Because each NRCS conservation practice came with a practice applied date, it was possible to select the records that were implemented within specific annual reporting periods (July 1–June 30). Each type of conservation practice is identified by a unique practice code that is described in USDA technical documentation, and each practice code has an associated practice lifespan (appendix D:1). Although the lifespan is not necessarily an accurate identifier of whether a practice is functioning, as opposed to decrepit, it does represent the average time period that the NRCS expects the practice to be functional. This information could therefore be useful in evaluating past implementation records to determine what reported practices are still functional in the landscape.

The Chesapeake Bay Program Office designates some practices as cumulative and others as annual. Data for practices with a long lifespan and multi-year contract, such as forest buffers, waste storage facilities, and barnyard improvements, are cumulative, and their count is additive over years within the CBP Partners water-quality models. Data for practices with a one year lifespan, such as cover crops, are refreshed annually and do not accumulate. The removal of expired practices from the dataset of accumulated historical records that has been reported to the CBP Partnership over time, to avoid over-crediting within the Chesapeake Bay Watershed Model, is an issue that was identified as a priority by the National Research Council (2011).

For each Annual Progress Review, only new implementation of practices is reported. Therefore, in the 2012 data preparation, lifespan was not used to select or remove records from consideration because the records were selected on the basis of implementation date (Practice_Applied_Date) and reported within a single yearly time span (July 1–June 30), and all practices have an associated lifespan of at least 1 year.

In addition to funded programs, the NRCS also maintains records (table 3) for practices that have received Conservation Technical Assistance (CTA) without financial assistance from the NRCS. The CTA entries can sometimes include valid, verified practices that are fully farmer funded and for which the NRCS provides technical oversight. These practices are common, for example, within the Plain Sect farm community ("Plain Sect" communities are Christian groups that may eschew technology or entering into contracts with the U.S. Government), and apart from CTA records they might otherwise go unreported. The CTA entries can also include practices that are cost-shared by jurisdictional agencies and therefore present a risk of double counting.

There is currently some debate about how accurate the CTA data are, with several NRCS collaborators expressing their opinion that CTA data entry is not consistently maintained across counties and jurisdictions, and recommending that the CTA data not be used in the Annual Progress Review (personal conversations with various State and national NRCS staff throughout 2012). However, other NRCS collaborators have expressed the opinion that CTA activities are entered only when the practices meet NRCS standards and specifications and so are valid for reporting purposes, as long as processes are in place to avoid double counting. In actuality, the quality of the data probably varies by jurisdiction depending on instructions and leadership coming from the NRCS State offices. Further discussion by the CBP Partnership is warranted to develop a policy regarding use and handling of CTA data.

Although the CTA records might provide a useful measure of conservation practices implemented without Federal financial assistance, currently the CBP Partnership has decided to prohibit the inclusion of these data in the Annual Progress Review, until they can confirm that the practices meet NRCS practice standards and specifications and protocols are established for ensuring that the records are not double counted. The CTA practices were identified in the NRCS dataset by contract program name = "Conservation Technical Assistance-General."

The USGS aggregated the CTA practice records by State, and included them in the aggregated USDA dataset as a separate table for informational purposes only, with instructions that they were not for use in reporting to the CBP Partnership's 2012 Annual Progress Review. The CTA practices ranged from 8 percent (Delaware) to 61 percent (Maryland) of total USDA conservation data records (table 3), which underscores the importance of the CBP Partnership working closely with USDA and the State NRCS offices to develop procedures for confirming the quality of the CTA data and ensuring that the data do not include

double-counted records. The NRCS CTA practices can be funded by non-NRCS sources, such as the State, EPA grants, or non-governmental organizations.

Removing Duplication Between NRCS and FSA Data Sources

Once tabulated, the USDA conservation practice datasets were analyzed to identify potential duplication between the NRCS and FSA data. Possible duplication was identified for practices that were funded by the FSA but for which Conservation Technical Assistance (CTA) was provided by the NRCS (table 4). These practices, which included NRCS practice codes 327, 332, 380, 386, 391, 393, 412, 512, 610, 612, 643, 656, 657, 658, and 659, were retained in the FSA dataset and were removed from the NRCS dataset. This removal of records did not affect the NRCS dataset that was ultimately reported to the CBP Partnership, because CTA data were summarized for information only and were not reported to the Annual Progress Review. After removing potential FSA-NRCS duplicates, the remaining records (table 3) comprised the unaggregated USDA conservation practices dataset. Removal of duplication between USDA and jurisdictional datasets is discussed further below, in the section “Protocols for Removing Double Counting.”

Table 4. List of practices where FSA provided financial assistance and NRCS provided technical assistance.—Continued

FSA practice code and name		NRCS practice code and name	
CP 18C	Permanent Salt Tolerant Vegetative Cover	327	Conservation Cover
CP 37	Duck Nesting Habitat	327	Conservation Cover
CP1	Permanent Introduced Grasses and Legumes	327	Conservation Cover
CP2	Permanent Native Grasses	327	Conservation Cover
CP27	Farmable Wetland Pilot Wetland	327	Conservation Cover
CP28	Farmable Wetland Pilot Wetland Buffer	327	Conservation Cover
CP33	Habitat Buffers for Upland Birds	327	Conservation Cover
CP42	Pollinator	327	Conservation Cover
CP4B	Wildlife Habitat Corridors Noneasement	327	Conservation Cover
CP4D	Wildlife Habitat Noneasement	327	Conservation Cover
CP15A	Contour Grass Strips	332	Contour Buffer Strips
CP15B	Contour Grass Strips on Terraces	332	Contour Buffer Strips
CP16A	Shelterbelt Establishment	380	Windbreak/Shelterbelt Establishment
CP17A	Living Snow Fences, Noneasement	380	Windbreak/Shelterbelt Establishment
CP5A	Field Windbreak Establishment	380	Windbreak/Shelterbelt Establishment
CP33	Habitat Buffers for Upland Birds	386	Field Border
CP22	Riparian Buffer (forested)	391	Riparian Forest Buffer
CP21	Filter Strips	393	Filter Strip
CP8A	Grass Waterways, Noneasement	412	Grassed Waterway
CP1	Permanent Introduced Grasses and Legumes	512	Forage and Biomass Planting
CP2	Permanent Native Grasses	512	Forage and Biomass Planting
CP27	Farmable Wetland Pilot Wetland	512	Forage and Biomass Planting
CP28	Farmable Wetland Pilot Wetland Buffer	512	Forage and Biomass Planting
CP33	Habitat Buffers for Upland Birds	512	Forage and Biomass Planting
CP 18C	Permanent Salt Tolerant Vegetative Cover	610	Salinity and Sodic Soil Management
CP18B	Permanent Vegetation to Reduce Salinity	610	Salinity and Sodic Soil Management
CP3	Tree Planting	612	Tree/Shrub Establishment
CP31	Bottomland Timber Establishment of Wetlands	612	Tree/Shrub Establishment
CP36	Longleaf Pine - Establishment	612	Tree/Shrub Establishment
CP3A	Hardwood Tree Planting	612	Tree/Shrub Establishment

Table 4. List of practices where FSA provided financial assistance and NRCS provided technical assistance.—Continued

FSA practice code and name		NRCS practice code and name	
CP4B	Wildlife Habitat Corridors Noneasement	612	Tree/Shrub Establishment
CP4D	Wildlife Habitat Noneasement	612	Tree/Shrub Establishment
CP25	Rare and Declining Habitat	643	Restoration and Management of Rare and Declining Habitats
CP12	Wildlife Food Plot	645	Upland Wildlife Habitat Management
CP39	Constructed Wetland	656	Constructed Wetland
CP23	Wetland Restoration	657	Wetland Restoration
CP23A	Wetland Restoration non-floodplain	657	Wetland Restoration
CP27	Farmable Wetland Pilot Wetland	657	Wetland Restoration
CP41	FWP Flooded Prairie Wetland	657	Wetland Restoration
CP9	Shallow Water Areas for Wildlife	657	Wetland Restoration
CP40	FWP Aquaculture Wetland Restoration	658	Wetland Creation
CP40	FWP Aquaculture Wetland Restoration	659	Wetland Enhancement

Data Aggregation To Protect Farmer Privacy

According to the USGS Data Handling Agreement (appendix B:8) that was approved by FSA Privacy Officer John Underwood (appendix A), aggregated totals can be reported to the public in compliance with 1619 regulations when five or more farmers are enrolled in a particular conservation practice within a particular geographical area. (This is the simplest and most conservative interpretation and is the one that was used by this project; see appendix B:8 for the more nuanced language.) Where fewer than five farmers are implementing a specific practice, the practice must be reported at a larger geographical scale or go unreported. For the 2012 data submission, it was decided to aggregate the USDA dataset to the county level. Therefore, any conservation practices that were employed by five or more farmers in a given county were reported by county, and any records with a smaller number of associated farmers were aggregated at the statewide level.

To apply the aggregation protocol to the NRCS data records, Practice Code was joined to Customer ID (appendix C:1), and the number of unique Practice-Customer combinations per county was counted. When one farmer (Customer) implemented multiple instances of the same practice (for example, application of the same practice to multiple fields), the farmer-practice combination was tabulated only once for the purposes of determining aggregation suitability. If the total number of farmers implementing a particular practice code was greater than four, then the total number of acres or units for all occurrences of that particular conservation practice (Report Applied Amount, appendix C:1) was calculated and reported as an aggregated total.

Whenever fewer than five farmers in a county were participating in a particular practice, those records were rolled up to the State geographical scale, at which point they were reported if more than five farmers were participating in these practices among all of the “leftover” records. Only data from counties that fell within or intersected the Chesapeake Bay watershed were included. If fewer than five farmers were participating in these “leftover” practices at the State level, the data were not reported, but the number of unreported practices was quite small (<5 per practice code and generally <1 percent of all practice records).

For each CRP and CREP practice, the FSA data were aggregated by joining Practice Code with Customer Number, then selecting distinct records of Practice Code, Customer Number, and Contract Number, and the total number of Practice Acres was reported at either the county or statewide scale for practices with five or more participating customers, following a similar logic to that employed for the NRCS dataset. The output of these protocols comprised the aggregated dataset.

Transmittal of Datasets to the State Jurisdictions

Practices implemented during the three progress years of 2010, 2011, and 2012 were provided to each jurisdiction and identified by the progress year (July 1–June 30) in which they were implemented. The aggregation protocol was applied separately to data from each progress year. The CBP Partnership has indicated that the history of reported conservation practices prior to 2010 is not eligible to be updated by the jurisdictions through NEIEN. For the 2012 Annual Progress Review, jurisdictions could update or replace NEIEN data for progress years 2010 through 2012 or could choose to report only 2012 implementation (practices implemented between July 1, 2011, and June 30, 2012).

APPENDIX F

The USGS-processed USDA conservation practice datasets were provided to the jurisdictions in either unaggregated format (NY, MD, VA) or aggregated format (PA, DE, WV), depending on preference and status of the jurisdictional 1619 Conservation Cooperator Agreements. Integration of State and Federal datasets, including removal of State-Federal double counting, was then achieved by each jurisdiction as described further below. In all cases, USDA conservation data were aggregated by either the USGS or the jurisdictions prior to submission to the Chesapeake Bay Program Partnership.

Practices implemented as NRCS Conservation Technical Assistance (CTA) were included in the data provided to the jurisdictions for informational purposes only, as a table of statewide aggregated CTA totals. For further discussion of CTA practices, see the section "NRCS Data," above.

Crosswalk Between USDA Practices and Chesapeake Bay Program Definitions

Jurisdictions report conservation practices to the Annual Progress Review using the National Environmental Information Exchange Network (NEIEN). The input to NEIEN is then transacted and processed into the Chesapeake Bay Program Partnership's "Scenario Builder" (*http://www.chesapeakebay.net/publications/title/documentation_for_scenario_builder*), which is used to fully develop input data for the CBP Partnership's Chesapeake Bay Watershed Model. To ensure that reportable USDA conservation practices would be properly accepted by the Chesapeake Bay Program Partnership, a crosswalk between NEIEN and USDA (FSA and NRCS) practice codes and CBP Partnership's Scenario Builder definitions for non-point source conservation best management practices (BMPs) was developed and provided to the manager of NEIEN System Requirements (Martin Hurd, appendix A). Any appropriate NRCS practices that were not already available for reporting via NEIEN were added to NEIEN and mapped to the appropriate Scenario Builder practice. The 2012 crosswalk is provided in appendix E. The crosswalk will need to be updated on an annual basis to reflect progressive changes in USDA and CBP conservation practice definitions.

Some management practices that receive financial assistance from the NRCS and (or) FSA are designed to conserve resources other than nitrogen, phosphorus, or sediment and so are not transmitted from NEIEN to Scenario Builder. Some examples of practices that are not addressed by the CBP Partnership because they are not relevant to nutrient and sediment conservation include fuel storage construction, tree/shrub pruning, and fish pond management. For practices that have a nutrient and (or) sediment reduction benefit, the CBP Partnership has a long-established protocol for considering new BMPs, and it is possible to add or change BMPs that have been accepted by the CBP Partnership (Chesapeake Bay Program Water Quality Goal Implementation Team, 2010).

There are several NRCS practices that are mapped to CBP Partnership practices where the definitions do not align precisely. One important example is wetland restoration, where NRCS definitions (practice codes 644, 658, 657, and 659) allow for cost-shared removal of *Phragmites* from existing wetlands, but this activity does not meet the CBP Partnership definition of the wetland restoration for nutrient and sediment control. Another is cover crops, where the NRCS allows for use of legumes, but the CBP Partnership's definitions currently do not. These practices, along with a number of other BMPs, are therefore sometimes only approximate matches. A detailed description of the most important discrepancies follows further below, in the section "More Comprehensive Tracking of Practices by NRCS."

Protocols for Avoiding Double Counting

There are many situations where a jurisdiction tracks an implemented conservation practice and the USDA also tracks the identical practice. Typically, both the jurisdiction and the USDA are tracking the same practice because they both provided financial assistance to the farmer for the practice implementation. In these cases, there must be a clear protocol in place to choose which data to report in order to avoid double counting (NRCS, 2011). In 2012, the six watershed jurisdictions employed various techniques to address this issue. The solutions, which are documented here, were tailored to address specific practices that could potentially receive financial assistance from both State and Federal programs, based on the range of conservation programs available to farmers within each jurisdiction. How the jurisdictions with independent access to USDA data through their agency 1619 Conservation Cooperator Agreements chose to handle any potential duplication within NRCS and FSA data sources and to remove Conservation Technical Assistance data records, as described above in "Removing Duplication Between NRCS and FSA Data Sources," was not documented.

The most general approach for removing double counting was to compare practice codes and definitions, identify which practice types could potentially be duplicated on the basis of knowledge of program structure, and exclude all records for those particular practice codes from either the USDA dataset or the jurisdictional dataset, generally retaining the records that contain a greater level of detail. For example, a cover crop practice might be funded at 40 percent of cost by State programs and 60 percent by the NRCS. Double counting of practices that could be co-cost-shared can be avoided by excluding records for those practices from either the State or NRCS dataset. For example, in Virginia, nutrient management plans were reported from the jurisdictional dataset and removed from the USDA dataset. Once the patterns of possible double counting are identified and the

choices of which practice codes to remove from which dataset are made, this broad-brush approach is relatively simple to implement and can be applied to aggregated datasets. The only drawback is that the method may perhaps remove some records in error, in the cases where similar practices can be either co-funded or separately funded by the USDA and jurisdictional programs (for example, cover crops in Lancaster County, PA). In those cases the separately funded instances would be removed as potential duplicates when they were in fact valid records.

Alternatively, a record-by-record comparison was employed to examine record details and determine which records were an exact match between USDA and jurisdictional datasets (the same practice applied to the same field location and acreage within the same implementation year). In those cases, all but one of the practices would be removed. This method is fairly accurate but is time consuming and requires access to the unaggregated USDA dataset (available only to 1619 Conservation Cooperators).

A third approach, available to jurisdictions that are 1619 Conservation Cooperators, was to maintain an integrated database that tracks all implemented conservation practices, whether funded by Federal or State governments or not financially assisted. In these data systems, when the Soil Conservation District staff work with farmers to implement conservation practices that receive financial assistance from both the State and Federal programs, the various funding sources are recorded as associated with a single data record, and it becomes straightforward to query the database and report implementation progress without risk of record duplication.

Each jurisdiction arrived at its own combination of methods to remove duplicate records, with generally good results. However, the process is not perfect, and continued attention to detail is required to successfully manage the complex task of obtaining and integrating implementation data for each specific type of conservation practice that is promoted by the various jurisdictional and Federal conservation agencies. The following sections document the jurisdiction-specific methods that were used to avoid double counting in 2012.

Delaware

Because they are not a 1619 Conservation Cooperator, the DE-DNREC has access only to aggregated USDA conservation data, obtained either from the USGS or from the State NRCS and FSA offices. The jurisdiction compared the USGS-provided data for 2010 and 2011 with what they had previously submitted, and the level of implementation for most practices was the same as or higher than what Delaware had previously reported, owing to differences in the data requested from the NRCS. In 2012, Delaware chose to use the USGS-provided aggregated dataset for all USDA practices in the 2012 Annual Progress Review data submission and replaced the 2010 and 2011 data with the USGS-provided data. Prior to 2010, Delaware had reported NRCS and FSA practices by using internal data sources.

In Delaware, most agricultural conservation practices were funded by either the USDA or the jurisdiction —but not both— and so duplication was not an issue. The main exception was cover crops, where financial assistance programs were offered by both the NRCS and the State. For cover crops, the State data contained a greater level of detail about specific cover crop management practices that could be used to obtain increased crediting for estimated nutrient and sediment load reductions in Scenario Builder. Delaware therefore chose to report all jurisdictional data for cover crops and to subtract the total of the State cover crop acres from the NRCS cover crop data. If there was a remainder in the NRCS cover crop acres, then those were also reported. Cover crop attributes that are not included in the NRCS data include crop variety, planting date, planting method, and commodity status (that is, whether or not the crop was sold as a commodity; however, Delaware no longer provides financial assistance for commodity cover crops as of fiscal year 2012).

Additional attention was paid to examining forestry practices in the NRCS dataset, and it was determined that there was no overlap with jurisdictional databases. Potential for overlap between the NRCS and Delaware Forest Service could be possible for forestry practices other than tree planting or forest harvesting, but those practices were not included in the NRCS dataset.

Maryland

As a 1619 Conservation Cooperator, Maryland was provided with unaggregated USDA conservation data by the USGS. However, Maryland chose not to use the dataset for reporting purposes, instead relying upon its jurisdictional integrated databases (including “Conservation Tracker,” as well as databases for cover crops and manure transport) and voluntarily completed Annual Implementation Report forms, all of which are maintained by the Maryland Department of Agriculture. This data system is used to record all conservation practices (financially assisted Federal and State practices, as well as those installed without Federal or State financial assistance) regardless of the source of financial assistance, through data entry that occurs at each Service Center Office. Any submission of the USGS-provided NRCS or FSA data would therefore be a duplicate.

In Conservation Tracker, practices that receive financial assistance from multiple sources are recorded as a single record item with data on percentage of financial assistance from each source, and double counting of records is thereby eliminated.

Because of the increased level of detail and accuracy, Maryland chose to submit only data from its jurisdictional databases to the CBP Partnership's Annual Progress Review.

The NRCS and FSA data provided by the USGS can be used by the Maryland Department of Agriculture as a management tool to assess the data quality and completeness of the Conservation Tracker dataset and to work with staff on improving reporting accuracy.

New York

As a 1619 Conservation Cooperator, the Upper Susquehanna Coalition (USC) was provided with unaggregated USDA conservation data by the USGS. However, the USC chose not to use the dataset for reporting purposes. Instead, it relied on direct query to the conservation districts. The NRCS and FSA data provided by the USGS was used by the USC to inform the direct queries of the conservation districts.

Because the portion of New York that falls within the Chesapeake Bay watershed is relatively small, the USC has established a system of meeting with the District Manager and the NRCS District Conservationist at each individual conservation district to quantify the annual implementation of both Federal- and State-supported conservation practices. Removal of State-Federal duplication was achieved during these discussions by carefully comparing programs and funded practices. The NRCS and FSA data provided by the USGS were used as a data check and helped to stimulate additional questions about conservation practice reporting in the data-collection meetings held with the conservation districts.

New York uses the State-funded Agricultural Environmental Management (NY-AEM) data system (*http://www.nys-soilandwater.org*) as its framework for conservation planning, data collection, and verification. In 2013, New York is transitioning to using an online toolkit linked to the NY-AEM to track and report data in a consistent format for NEIEN submission. The same protocols as 2012 will be followed, but the data will be processed through the online system.

Pennsylvania

Because it is not a 1619 Conservation Cooperator, the Pennsylvania Department of Environmental Protection was provided with aggregated USDA conservation data. The jurisdiction used the USGS-provided data in the 2012 Annual Progress submission to CBP and also used a USGS-provided dataset to report NRCS and FSA practices in 2011. Prior to 2011 the jurisdiction reported FSA and NRCS conservation practices by using NRCS county summaries that were then available on the Web.

The PA-DEP does not have a 1619 Agreement with the NRCS or FSA and, therefore, could not identify duplicates other than by using the broad-brush approach of comparing practice codes. The jurisdiction indicated that all NRCS and FSA practices were retained in the USDA dataset and that any equivalent practices were removed from Pennsylvania State data sources prior to reporting.

Virginia

As a 1619 Conservation Cooperator, the Virginia Department of Conservation and Recreation was provided with the unaggregated USDA conservation dataset. The jurisdiction performed a comparison with USDA conservation data obtained directly from the Virginia State NRCS office. The two NRCS datasets differed somewhat, because the USGS data were pulled in tabular format from the NCP database whereas the locally sourced data were obtained by using the NRCS Integrated Data for Enterprise Analysis (IDEA) geospatial interface. The jurisdiction found that they were able to link more practice data to contract data by using the locally obtained dataset than was possible with the data that the national NRCS office provided to the USGS. Virginia chose to use the State-provided NRCS data in the 2012 Annual Progress submission to CBP and did not use the USGS-provided dataset for reporting purposes.

The majority of conservation practices that could possibly receive financial assistance from both Virginia and the NRCS, and were therefore at risk for double counting, were nutrient management practices and cover crops. Virginia decided to report these practices by using the State-funded database and to remove them from the reported NRCS practice database. Enhanced nutrient management was recorded only in the USDA dataset and, therefore, was not subject to duplication. Additional practices that might receive financial assistance from both State and Federal programs were compared on a line-by-line basis, using data for farm owner/operator, location, and acreage. Potential duplicate records were flagged and removed from the NRCS database.

Starting in July 2013, the Virginia Department of Environmental Quality (VA-DEQ) will be the State agency receiving the CBP Chesapeake Bay Regulatory and Accountability Grant supporting reporting efforts and will be responsible for reporting all conservation practices for the CBP Partnership's Annual Progress Review, based on actions during the recent General Assembly and decisions between the Office of the Secretary of Natural Resources and the Directors of the VA-DCR and VA-DEQ. William Keeling (appendix A) was transferred from VA-DRC to the VA-DEQ in late June 2013. The above-described process

for potential duplicate removal may therefore be changed for 2013 and future years, since the VA-DEQ does not have a 1619 Cooperator Agreement with the USDA. Specifics of an adjusted protocol for addressing double counting and reporting conservation data to the 2013 Annual Progress Review are currently being discussed by the VA-DCR and VA-DEQ.

West Virginia

Although West Virginia is a 1619 Conservation Cooperator through the WVDA and WVCA, the jurisdiction chose to be provided with the aggregated USDA conservation dataset due to State NRCS staffing and priorities. West Virginia validated the data by comparing the USGS-provided dataset with data obtained through NRCS field offices and the FSA State Office, and determined that the USGS-provided data were of similar quality to what West Virginia had previously reported, and in some cases included higher levels of implementation. West Virginia therefore chose to use the USGS-supplied aggregated dataset to report USDA conservation practices to the 2012 Annual Progress Review. Prior to 2012, West Virginia had reported NRCS and FSA practices using the then-publicly available "PRS" database from the NRCS Web site, as well as NRCS, FSA, and internal data sources.

To compile jurisdictional data for the Annual Progress Review, the WVDEP requested data from the WVDA and WVCA, as well as internal WVDEP sources. In 2012, the West Virginia Agricultural Enhancement Program (AEP) only funded instances of practices that were not funded by the NRCS. A cross-checking procedure is in place between the agencies at the conservation districts, and the WVCA kept records for only AEP-funded instances of practices; thus, there was no chance of duplication. Two FSA practices funded through the CREP program also were reported in West Virginia State databases: filter strips (CP-21) and riparian buffers (CP-22). The jurisdiction chose to report all USDA practices contained in the USGS-provided dataset and removed, as necessary, filter strips and riparian buffers on crop or pasture from the jurisdictional dataset prior to reporting.

Final Submission of 2012 Conservation Data to the Annual Progress Review

Each of the jurisdictions submitted records of State-funded conservation practices, along with aggregated records of USDA-funded conservation practices, to their respective State's NEIEN data nodes by December 31, 2012. The USGS-sourced dataset was used by Delaware, Pennsylvania, and West Virginia to report USDA conservation practices. Maryland, New York, and Virginia chose to rely upon their individual 1619 Conservation Cooperator Agreements to obtain direct access to USDA conservation data at the State level and used the USGS-provided data only for comparison and quality control.

Once data records are submitted to NEIEN, they are processed through the CBP Partnership's Scenario Builder, and each jurisdiction receives a report of what practices were given credit. At that point, the jurisdictions have the opportunity to modify, correct, and resubmit the data records. Modifications are typically made to correct for technical issues related to the NEIEN node format and proper attribution of conservation practice data records. However, at this point in the process, the role of the USGS in providing USDA conservation datasets to the jurisdictions is complete.

2013 and Onward: The Drawing Board for Further Improvements

This project was initiated to provide the Chesapeake Bay watershed jurisdictions with consistent access to USDA conservation practice data and to streamline data reporting and ease the required time burden for Federal and jurisdictional partners to deliver data for the CPB Partnership's Annual Progress Review. Although these goals were largely accomplished, targets for future improvement were also identified. The objective for 2013 and future years is to obtain datasets of equal or better quality that are more tailored to the needs of the jurisdictions. This report provides the foundation to make documented improvements in future data-handling procedures.

Improvements in Requesting Data

In 2012, the USGS succeeded in obtaining conservation practice datasets from the USDA, processing them, and providing both aggregated and unaggregated data to the six jurisdictions. The USGS will again request and process USDA data for the 2013 Annual Progress Review. Although this past year was a success in that a comprehensive USDA dataset was compiled and delivered to the jurisdictions, there is room for continued improvement in the details of how the data are obtained and what is included in the dataset.

Generally, the 2012 dataset proved to be thorough and adequate to meet the needs of data reporting and removal of double counting. However, in Virginia, the lead responsible for data reporting (Bill Keeling, with the VA-DCR in 2012, appendix

A) preferred a similar NRCS conservation practices dataset that was provided by the Virginia NRCS State Office Geospatial Information Systems (GIS) Specialist, Fred Garst (appendix A), using the NRCS Integrated Data for Enterprise Analysis (IDEA) interface. The IDEA dataset was preferred to the 2012 USGS-sourced dataset because the data were provided in a single table and contained more thorough information linking practices to conservation plans, a feature that was useful in removing double counting. Mr. Garst also reported that the land-use data field was populated in the IDEA database (this field is only sparsely populated in the NCP database that the USGS obtained) and that he had not noticed any internal duplication of records. The USGS is working with the USDA to improve the data request to resolve these questions and maximize the range of available information.

For the 2013 Annual Progress Review, the USGS will again obtain data in tabular format from the NCP database, using an updated data request that addresses these concerns (appendix C:5).

Anticipated timeline:

- July 15 – Submit data request to the NRCS
- July 15 – Submit data request to the FSA
- August 15 – USGS/jurisdictions receive the FSA dataset
- October 1 – CBP Partnership Scenario Builder practice definitions finalized for the year
- October 15 – CBP Verification Committee approves updated crosswalk
- October 15 – USGS/jurisdictions receive the NRCS dataset
- November 1 – USGS delivers aggregated USDA data to the jurisdictions
- December 1 – Jurisdictions submit integrated Federal-State dataset to the CBP Partnership's Annual Progress Review via NEIEN

The NRCS is currently undertaking a Conservation Delivery Streamlining Initiative (CDSI) and has plans to integrate the NCP and IDEA data systems (*http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/about/cdsi/*). Similarly, the FSA is reengineering its conservation practice database under the Modernize and Innovate the Delivery of Agricultural Systems (MIDAS) program (*http://www.fsa.usda.gov/FSA/newsReleases?area=newsroom&subject=landing&topic=pfs&newstype=prfactsheet&type=detail&item=pf_20120507_admin_en_midas12.html*). These changes at the USDA are moving toward increased clarity and detail in conservation data management, and while the implementation of practices will likely remain consistent, the associated information that will be available in future years may look quite different from the 2012 dataset. It will be important to maintain the level of discussion and collaboration achieved in 2012 to smoothly integrate these expected changes with jurisdictional datasets and facilitate data transfer between State and Federal agencies.

More Comprehensive Tracking of Practices by the USDA

In preparation for discussions with the USDA, the members of the CBP Partnership's Agriculture Workgroup have identified opportunities to enhance the recordkeeping associated with USDA conservation practices, in order to capture specific information that can be used to more efficiently integrate the data with jurisdictional datasets and to more accurately represent the practices in Scenario Builder, and in the various CBP Partnership water-quality models. A list of USDA conservation practices was identified (table 5) as having substantial limitation in the amount of data available for translating between USDA conservation practice codes and CBP Partnership approved practice definitions. These practices are discussed below. Other conservation practices not represented here may also have data limitations depending on their use and reporting. In many cases, these limitations could be addressed through simple techniques such as the use of modifying letter codes to distinguish among the various conservation techniques that fall within each practice code definition. The CBP Partnership's protocols generally assume the lowest available estimated load reductions for conservation practices whenever there is not detailed information available to support a higher conservation effectiveness estimate.

Land Use and Livestock Animal Type

Limitation: The NRCS currently has fields in its data collection system for land use and livestock type, associated with a variety of conservation practices. However, these data fields were rarely populated in the 2012 NRCS dataset provided to the USGS from the NCP database. The CBP Partnership definitions place practices in the context of land use (for example, pasture fencing receives a reduction for CBP only when applied to riparian areas).

Opportunities: Populating the data fields for land use and livestock type could allow the six watershed jurisdictions to receive more accurate crediting for many different conservation practices whenever conservation practice efficiency in reducing nutrient and sediment loads is modified by land use (for example, farm headquarters, forest, crop/hay, range/pasture) or animal type (for example, manure management, feed management). Currently, default values are assigned to unreported elements by using conservative effectiveness values. Although populating these fields would represent additional effort on the part of NRCS staff, the benefit could be more accurate recognition of increased pollutant load reductions from agricultural lands.

The current land-use and animal-type information may possibly exist in other NRCS datasets such as the IDEA system, in which case the problem becomes one of linking the data to the NCP records rather than ensuring data entry in the Service Center Offices. The land use changes "from" and "to" do not presently exist in NRCS databases, only the current land use. The livestock animal type is available in ProTracts, but is not in Toolkit or the field is not populated in the NCP database. The number of animals or animal units associated with a livestock conservation practices could also be useful for obtaining full nutrient conservation credits in the CBP Partnership's water-quality models. [Note: data for land use and livestock types were successfully acquired in October 2013. This acquisition was made possible by changes in the NRCS database that fully linked the land use and livestock type to the practice implementation data. However, numerous cases of missing land use and livestock type data entries persisted.]

Cover Crops

Limitation: The NRCS currently defines, tracks, and reports cover crops under a single conservation practice code (340) and standard. The Chesapeake Bay Program Partnership currently defines cover crops by four attributes (species, planting method, timing of planting, and harvest strategy) to determine their effectiveness in reducing the loss of nutrients and sediments to the environment. In particular, the NRCS lumps leguminous cover crop types with all cover crops. The CBP does not currently consider leguminous cover crops as having a nitrogen benefit since they fix nitrogen in the soil. These additional attributes presently are not currently available in any NRCS business tool.

Opportunities: Enhancements to record keeping for the USDA conservation practice code for cover crops that could track and report additional management details identifying all four cover crop attributes, or even a single attribute such as species, could allow the six watershed jurisdictions to receive more accurate crediting of cover crops and more thorough representation in the Chesapeake Bay Program Partnership's models. In Scenario Builder, conservative default values are assigned to unreported elements when clarifying information is not available. At present, NRCS staff have indicated that they are unlikely to track cover crops with more specificity because the present system does not allow for enhancements to record keeping.

Fencing

Limitation: The NRCS currently defines, tracks, and reports fencing practices under a single conservation practice code (382) and standard, whereas the Chesapeake Bay Scenario Builder defines the nutrient benefits associated with fencing as a component of the management change the practice creates. Examples include the establishment of riparian buffers versus rotational grazing of livestock.

Opportunities: Enhancements to recordkeeping for the USDA conservation practice code for fencing that could identify the location and use of the fencing, or the associated components of the management system, could allow for better utilization within the CBP water-quality models. One example would be to link riparian forest buffers (391), riparian herbaceous cover (390), or stream crossings (578) by using a modifier to the fencing code representing riparian fencing. For grazing and pasture management improvements, the fencing code could be linked with prescribed grazing (528) or animal trails and walkways (575). Other conservation practices that potentially could be associated with fencing-related agricultural land management changes include watering facilities (614) and spring developments (574). The Pennsylvania State Office for USDA-NRCS has been investigating opportunities to enhance data collection for conservation practice code 382 (fence) through linkage to associated conservation management practices. The NRCS maintains a practice code for access control (472) where animals are excluded from the stream corridor, but the other information is not currently present in any NRCS business tool.

Nutrient Management

Limitation: The NRCS currently defines, tracks, and reports nutrient management under a single conservation practice code (590) and standard, with additional codes for Comprehensive Nutrient Management (304) and Nutrient Management Planning (104, 105). The CBP Partnership currently defines nutrient management under three management levels including crop group nutrient application management, enhanced application nutrient management, and decision/precision agricultural nutrient application management, with different associated effectiveness values for reducing nutrient losses to the environment. The

'crop group nutrient application management' category was recently developed to replace the former category of nitrogen-based nutrient management. The CBP Partnership is also currently reviewing the enhanced and decision/precision nutrient application management practices, and will likely revise the definitions for these practices so they are more focused on the use of field-scale nutrient applications.

Opportunities: Enhancements to recordkeeping for the USDA conservation practice codes for nutrient management that could more readily identify differences among the three tiers of practice categories, and allow for improved data utilization by the jurisdictional partners and within the CBP Partnership's water-quality models. The new nutrient management standards for practice 590 standards have substantially expanded the categories of nutrient management that are eligible for NRCS technical support, but without an associated identifying code that can be used for reporting. Nutrient management plans for cropland are contracted as NRCS activities 104 (written) or 105 (applied) using a single practice code, which does not allow for differentiation among the planning strategies identified in the CBP Partners' nutrient management planning definitions. An example of possible practice code enhancements was developed by the Maryland State Office of USDA-NRCS to track and report multiple (four) nutrient management categories through the use of a letter suffix to the conservation practice code.

Feed Management

Limitation: The NRCS currently defines, tracks, and reports feed management under a single conservation practice code (592) and standard for multiple livestock species and does not typically track and report the type and amount of manure nutrient reductions resulting from changes in feed management. Feed management systems can focus on nitrogen and phosphorus individually or in combination, leading to different results. The CBP Partnership defines feed management effectiveness as the change in pounds of nitrogen and phosphorus reduced in a particular animal type's manure as a result of the reduction or enhancement of feed nutritional components.

Opportunities: Enhancements to recordkeeping for the USDA conservation practice code for feed management that could identify differences in feed management focused on nitrogen and phosphorus separately or in combination, and could track and report changes in manure nutrient concentrations as a result of the practice, could allow for improved data utilization by the jurisdictional partners and within the CBP Partnership's water-quality models. Associated livestock type and number could also be useful. The Pennsylvania State Office of USDA-NRCS has taken the initiative to obtain copies of farm feed management plans and to work with agricultural technical service providers to record and analyze theses data and enable tracking of the results. This information is currently not available in any NRCS business tool.

Forestry Practices

Limitation: Forest buffers are tracked by the FSA in units of acres. As part of the 2007 Forest Directive adopted by the CBP Partnership Executive Council, forest buffer goals were established and are tracked by length and width of stream miles buffered, rather than acres. Also, in the FSA CRP/CREP database, the distinction between new forest buffers versus re-enrollment of existing forest buffers is not recorded consistently, so avoiding double counting can be difficult.

Opportunities: Jurisdictions provide the length and width of implemented forest buffers to the CBP Forestry Workgroup for assessment of goal achievement. However, jurisdictions rely on the FSA data for reporting to the CBP Partnership's Annual Progress Review. The tracking of forest buffer length and width by the USDA-FSA could provide more precise information that could take into account different load reductions for narrower versus wider buffers (for example, 35 feet versus 100 feet). In addition, potential double counting between historic and current implementation could be avoided if the FSA were to record consistently and accurately whether a buffer was re-enrolled as opposed to newly installed. A similar issue of re-enrollment may exist for land retirement.

Wetlands

Limitation: The NRCS currently defines, tracks, and reports wetland conservation practices under four separate conservation practice codes (644, 658, 657, and 659) and standards. The CBP Partnership currently defines wetland conservation practice efficiencies on the basis of a single practice of wetland restoration that includes restoration, enhancement, or creation of wetlands, and distinguishes between streamside and other areas. The NRCS practice definition includes *Phragmites* spraying for invasive weed control, whereas the CBP Partnership definition does not accommodate *Phragmites* spraying. The CBP Partnership is addressing this discrepancy through its wetlands workgroup.

Opportunities: Enhancements to the CBP Partnership's practice definitions for wetlands could enable more accurate calculation of nutrient and sediment loads associated with the variety of NRCS wetland conservation practices and could allow for improved data utilization by the jurisdictional partners and within the CBP Partnership's water-quality models.

Tillage

Limitation: The NRCS tillage practice definitions do not define the minimum amount of residue remaining on the field. All Chesapeake Bay Program tillage BMPs include a minimum residue coverage percent. This is because water-quality benefits are most tied to the residue coverage.

Opportunities: Refine the NRCS tillage practice definitions to include the minimum residue coverage. Because a high degree of soil cover dramatically increases water infiltration and storage and decreases soil erosion and soil-bound nutrient losses, encouraging the use of tiers of residue management could benefit water-quality conditions

Table 5. Possibilities for improved recordkeeping for USDA conservation practices.—Continued

Category	USDA code	Possibility	Relation to currently collected data
Land Use	Many	Record land use and land use change "from" and "to," and integrate datasets to make land use information consistently available in the National Conservation Planning (NCP) dataset.	NRCS has a data field for land use identification (ID), but it is generally not populated in the NCP database. The change "from" and "to" are not available in any NRCS business tool.
Livestock Animal Type	Many	Record livestock animal type (for example, beef, dairy, poultry) for relevant conservation practices.	NRCS has a data field for livestock_ID in ProTracts, but in the 2012 dataset it was only sparsely populated in the NCP database.
Cover Crops	340	Record cover crop management details including species, planting date, planting method, commodity versus regular, and if manure was applied (for example., commodity early drilled rye-aerial-no manure).	Cover crop is defined broadly in NRCS data, whereas the CBP applies nitrogen conservation effectiveness values that range from 5% to 45%, depending on management. This information is currently not available in any NRCS business tool, so Scenario Builder assigns conservative estimates for NRCS cover crops.
Fencing	382	Identify the location and use of the fencing, or the associated components of the management system.	NRCS currently defines, tracks, and reports livestock fencing under a single Conservation Practice Code (382). The practice Access Control could show where animals are excluded from stream corridor, but this currently is not in any current NRCS business tool.
Nutrient Management	590, 104/105	Differentiate various nutrient management planning and implementation strategies to match CBP Partnership definitions.	NRCS currently defines, tracks, and reports nutrient management under a single Conservation Practice code (590), and nutrient management plans are contracted as practice 104 (written) and 105 (applied).
Feed Management	592	Record the animal type, management strategy, and differentiate between nitrogen- versus phosphorus-based feed management.	NRCS currently tracks and reports feed management under a single Conservation Practice code (592) for multiple livestock species and does not typically track the type and amount of manure nutrient reductions resulting from changes in feed management.
Forestry Practices	CP-22	Record length and width of the buffer rather than acreage. Indicate consistently and accurately if a buffer is re-enrolled versus newly installed.	Forest buffers are currently tracked by FSA in units of acres. Including length and width would take into account different load reductions for narrower versus wider buffers. Double counting could be avoided if FSA indicates consistently and accurately whether a buffer is re-enrolled versus newly installed.

Table 5. Possibilities for improved recordkeeping for USDA conservation practices.—Continued

Category	USDA code	Possibility	Relation to currently collected data
Tillage Practices	324, 329, 345, 346, 761, 778	Include the residue cover amount in the practice standard to indicate minimum percent of cover remaining after harvest.	Current NRCS practice standards for tillage do not include a minimum amount of residue remaining after harvest. CBP Partnership Expert Panels have found that water-quality benefits for tillage practices vary greatly depending on the amount of cover, and jurisdictions can more accurately show improvement if they have this information.

Continuing to Improve Practice Definitions

The definition and crediting of conservation practices within the CBP Partnership's water-quality models via the NEIEN and Scenario Builder data exchange and crediting system is a process that is under continuous development, negotiation, and improvement through coordination with the CBP Partnership's Watershed Technical Workgroup *(http://www.chesapeakebay.net/groups/group/watershed_technical_workgroup)* and Water-quality Goal Implementation Team (*http://www.chesapeakebay.net/groups/group/water_quality_goal_implementation_team*).

Because the USDA promotes a wide variety of conservation practices not always focused on nitrogen, phosphorus, and sediment control, and because the various datasets are sometimes kept in different measurement units and with more or less detail, the translation of USDA practice codes to NEIEN and CBP Partnership's Scenario Builder format is not always straightforward. However, a formal process of definition, verification, and accounting is in place, overseen by the CBP Partnership's Watershed Technical Workgroup, with a robust capacity for adaptive change and incorporation of new conservation practices as they become available.

Further discussion might be warranted regarding the current CBP Partnership's definition of cover crops and wetland restoration. For example, wetland restoration by the NRCS can include weed control (for example, *Phragmites*) for habitat restoration, and cover crops financed by the NRCS can include nitrogen-fixing legumes, but neither of those practices meet CBP Partnership approved practice definitions for nutrient and sediment reductions. However, a large proportion of the NRCS wetland and cover crop practices do meet CBP Partnership guidelines and can be credited. Unless the implementation datasets are kept in greater detail (as is happening under jurisdiction data management initiatives in MD and NY), the manner in which these NRCS practices are credited is a matter for negotiation within the CBP Partnership.

As jurisdictions interact with the CBP Partnership's Chesapeake Bay Program Office staff to prepare for each Annual Progress Review data submission, as conservation practice financial assistance programs are modified and developed, and as new practice definitions are adopted by the CBP Partnership, the system will continue to evolve in response. In 2013, discussion and modification of practice definitions will be allowed only until October 1, at which point the crosswalk document that translates USDA conservation practices to the CBP Partners' BMP definitions (appendix E) will be updated for approval by the CBP Partnership's technical workgroups and the Water-quality Goal Implementation Team for use in the 2013 Annual Progress Review.

Increasing Information Availability to the Public

An important goal of conservation data reporting is making the information available to the public. Conservation data products that maintain farmer privacy while describing conservation progress can help farmers and conservationists to understand and document the role that agricultural conservation plays in attaining water-quality objectives.

Tracking conservation practice implementation is important for a variety of reasons that are completely separate from TMDL regulations. Although the immediate impetus for such tracking is the CBP Partnership's Annual Progress Review, the long-term goal is improving local and Chesapeake Bay water-quality through all possible means. Increased knowledge of what practices have been implemented can help to guide water-quality planning. While keeping the private information confidential, the aggregated data could be made available on public Web sites for use by land managers.

Aggregation to subwatershed scale, rather than county scale, could assist watershed planners and scientists in linking conservation practice implementation to water-quality outcomes. It could be possible to create a mechanism for Web-enabling

access to aggregated data, making the information about current levels of implementation more publically available. Flexible tools for public watershed planning and conservation practice implementation that integrate this information could facilitate progress toward water-quality improvements. The USDA conservation practice data described in this report are also being made available to USGS scientists who, as 1619 Conservation Cooperators, are using the information in a confidential manner, to support Chesapeake Bay watershed studies and landscape conservation initiatives.

Conclusions

In 2012, the coordinated partnership of Federal and State efforts resulted in a successful reporting of agricultural conservation practices that had been recently implemented on Chesapeake Bay farms and farmland. Although the process was not perfect, the diverse data reporting strategies employed by the jurisdictions were all successful in reporting conservation practices while largely avoiding double counting of records for which financial assistance was provided by both Federal and State agencies. These methods have now been documented, and possible improvements for future years have been identified.

For the three jurisdictions that used the USGS-sourced dataset for reporting purposes (DE, PA, and WV), streamlining the conservation data collection process enabled the development of a more consistent and complete dataset. These jurisdictions were able to report implementation of USDA conservation practices more thoroughly than they previously had, improving their ability to track progress towards achieving water-quality objectives.

The remaining three jurisdictions (MD, NY, and VA) chose not to use the USGS-sourced dataset for reporting purposes, instead relying upon USDA conservation practice information that they obtained independently using their jurisdictional 1619 Conservation Cooperator Agreements. In the case of Virginia, the jurisdiction could have used USGS-sourced data for simplicity's sake if their double-counting procedure had not entailed line-by-line comparison of records for which the State-sourced USDA dataset contained more detailed relationships between contracts and practices. The USGS is currently working with the NRCS to improve the USGS-USDA data request to obtain any missing detail to facilitate double-counting removal in Virginia and other jurisdictions in future years.

In Maryland and New York, the jurisdictions obtained USDA data from their own State-sponsored reporting systems, into which data are input by their Soil Conservation District offices. Because these databases contained both Federal and State conservation practices, they were able to remove double counting and calculate aggregated totals through a statewide database query, in the case of Maryland's Conservation Tracker system, or on a county by county basis, in the case of New York. Double-counting issues were therefore handled internally and were not documented in this report. In future years, it may be beneficial to expand the documentation of methods used to remove double counting of conservation records to include a more through description of jurisdictional conservation datasets. It is also worth noting that Lancaster County Conservation District in Pennsylvania has developed a comprehensive conservation planning and tracking system of comparable detail (PLANT, *http://www.nacdnet.org/dmdocuments/Revolutionizing_Conservation_Planning_AH.pdf*), but those data were not used by the Pennsylvania Department of Environmental Protection in its submission for the CBP Partnership's Annual Progress Review. Jurisdictions with combined State-Federal conservation tracking systems do not require USGS involvement in providing a USDA data product. In any case, the USGS-USDA 1619 Conservation Cooperator Agreements are set to expire in 2015, by which time direct transfer of data from USDA to the jurisdictions will be required.

However the data are obtained, accurate, consistent, detailed information on conservation practice implementation can improve the knowledge used for planning and targeting conservation practices, promoting sustainable agricultural management strategies, and supporting an adaptive management approach to improving water-quality in the Chesapeake Bay watershed. Tracking conservation progress provides the information necessary for prioritizing BMP implementation across the landscape and comparing implementation to pollutant load trends and water-quality response. This project has documented a strategy for obtaining and handling USDA farmland conservation data and for integrating these data with State conservation datasets, for the purpose of reporting them to the public in an aggregated format that protects farmer privacy while also documenting the tremendous progress that is being achieved in conservation farming. This information is one part of a larger discussion of implementation and verification of the diverse range of Federal, State, and privately funded conservation practices that are adopted by Chesapeake Bay farmers, whether in response to regulation, incentive, or stewardship of the land.

Acknowledgments

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Thanks to Dana York, Leonard Jordan, USDA NRCS, and Dave Kirtland, USGS, for their roles in establishing the USGS-USDA 1619 Conservation Cooperator Agreements without which this project would not have been possible. Thanks to the USDA REAP team for their initial descriptions of the various available USDA datasets and their review of aggregation protocols. And thanks to Kelly Shenk, EPA Region 3 Water Protection Division, Mark Dubin, University of Maryland/ Chesapeake Bay Program Office, Susan Marquart, Pennsylvania NRSC State office, and Anne Swanson, Chesapeake Bay Commission, for continuing to provide the discussion to move these projects along. Thanks to the Chesapeake Bay Program Partnership's Verification Committee and many other individuals who provided review and comments on the draft versions of this report.

The project is indebted to several people at the USDA, including John Underwood, FSA, David Butler, NRCS, and David Parry, FSA, for their hard work in reviewing permissions and providing datasets, as well as helping to educate us on the necessary details. Special thanks go to Richard Sims and Leonard Jordon for their work in initiating this project, reviewing this report, and providing much needed assistance along the way. The project is likewise indebted to numerous people at the jurisdictional agencies for having the patience to engage in prolonged and thorough discussion of the many details involved in accurately reporting the variety of conservation practices employed by thousands of Chesapeake Bay watershed farmers.

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U.S. Environmental Protection Agency, 2010, Chesapeake Bay TMDL for nitrogen, phosphorus and sediment: Accessed October 31, 2013, at *http://www.epa.gov/reg3wapd/tmdl/ChesapeakeBay/tmdlexec.html*.

Appendix A: Key Contacts

U.S. Geological Survey (USGS)

Dean Hively, Research Physical Scientist, USGS Eastern Geographic Science Center. Posted to USDA-ARS Hydrology and Remote Sensing Laboratory, Bldg 007, Room 104, BARC-W, 10300 Baltimore Avenue, Beltsville, MD 20705, phone 301-504-9031, email whively@usgs.gov [instrumental in project coordination, communication, analysis, and drafting of report].

Olivia H. Devereux, Environmental Scientist, Devereux Environmental Consulting (contractor to USGS through Cherokee Nation Contract #G12PA0003), phone 301-325-7449, email olivia@devereuxconsulting.com [instrumental in data processing, communication, analysis, and drafting of report].

Peter Claggett, Geographer, USGS Eastern Geographic Science Center, phone 410-267-5771, email pclagget@usgs.gov [instrumental in establishment of USGS 1619 agreement and initial project organization].

Renee Thompson, Geographer, USGS Eastern Geographic Science Center, phone 410-267-5749, email rthompson1@usgs.gov [instrumental in developing data aggregation techniques].

Dave Kirtland, Director, USGS Eastern Geographic Science Center, 12201 Sunrise Valley Drive, MS 521 Reston, VA 20192, phone 703-648-4712, email dakirtland@usgs.gov [instrumental in establishment and oversight of USGS 1619 agreement].

U.S. Department of Agriculture, Farm Service Agency (FSA)

John Underwood, FSA Privacy Officer, phone 816-926-6992, email john.underwood@kcc.usda.gov [the one and only best contact for approval and authorization of 1619 Conservation Cooperator Agreements and data aggregation requirements, for NRCS as well as FSA data].

Barbara J. Clark, USDA/MSD/KCASB/IMS, Government Information Specialist, Farm Service Agency, 9240 Troost Ave., Mail Stop 8368, Kansas City, MO 64131-3055, phone 816-926-2636, email barbara.clark@kcc.usda.gov [main contact for formatting the FSA Farm Practices data request, which was submitted to RA.mokansasc2.fsakcfoia@one.usda.gov].

David Parry, Customer Service Supervisor, USDA Farm Service Agency Aerial Photography Field Office, 2222 West 2300 South, Salt Lake City UT 84119-2020, phone 801-844-2923, email david.parry@slc.usda.gov, Web site http://www.apfo.usda.gov [responsible for and delivered the FSA geospatial dataset, receives CREP and CLU data from State GIS leads to update national database].

Chris(tina) Rotz, Agricultural Program Specialist, Pennsylvania, USDA-Farm Service Agency, phone (717)237-2165, email christina.rotz@pa.usda.gov [Pennsylvania State GIS Specialist, collects data from the counties and prepares the monthly data submission of FSA conservation practices that is transmitted to the national database in Utah; she was a useful consultant on the understanding the appropriate timing of a data request (August) to reflect FSA practices implemented before the June 30 reporting deadline].

Charles “Michael” Boyles, FSA/ ITSD/ADC/PSCAO Farm Service Agency, 6501 Beacon Drive Kansas City, MO 64133, phone 816-926-1905, email Mike.Boyles@kcc.usda.gov [useful contact for CREP program details].

U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS)

David Butler, NRCS Information Technology Center, Fort Collins, CO, phone 970-295-5545, email david.butler@ftc.usda.gov [key point of contact for obtaining NRCS conservation practice data, provided 2012 dataset to USGS].

Arlen E. Ricke, Natural Resource Manager, NRCS, Washington, DC, phone 202-720-1868, email arlen.ricke@wdc.usda.gov [NRCS signatory on 2012 USGS data request].

Richard Sims, Regional Conservationist for the Northeast, NRCS Office of the Chief, Washington, DC, phone 515-284-6655, email Richard.Sims@id.usda.gov [instrumental in maintaining NRCS leadership in this project and supporting 1619 negotiations in 2013].

Leonard Jordan, Associate Chief for Conservation, NRCS Office of the Chief, Washington, DC, phone 706-546-2272, email leonard.jordan@wdc.usda.gov [instrumental in establishing the 1619 Conservation Cooperator Agreements with the USGS that were signed in 2010].

Brandon J. Schneider, J.D., M.B.A., CIPP/G, Privacy Specialist, Vistronix, Department of Agriculture/NRCS, cell 703-447-5878 [instrumental on 2012 USGS data request].

Michael A. Sheaver, Security Operations Branch Chief, NRCS, phone 202-720-0040, cell 703-200-3008, email Michael.Sheaver@wdc.usda.gov [instrumental on 2012 USGS data request].

Susan Marquart, Natural Resource Specialist, Pennsylvania Chesapeake Bay Coordinator, USDA Natural Resources Conservation Service, One Credit Union Place, Suite 340, Harrisburg, PA 17110-2993, phone 717-237-2237, fax 717-237-2238, email Susan.Marquart@pa.usda.gov [involved in discussion of data availability and 1619 agreements].

Denise Coleman, NRCS Pennsylvania State Conservationist, phone 717-237-2203 [involved in 1619 discussions with Pat Buckley].

Barry Frantz, Assistant State Conservationist, Programs, Harrisburg, PA 17110-2993, phone 717-237-2216, email barry.frantz@pa.usda.gov [provided comments about interpretation of lifespan].

Mary Grande, NRCS Business Tools Specialist, Ft. Collins, CO, phone 970-295-5626 [provided input on fig. 2].

NRCS REAP Program staff were helpful consultants on available NRCS database structure and on aggregation protocol recommendations: **Janet Perry**, NRCS Resource, Analysis and Policy Division, Washington, DC, phone 301-504-2314, email janet.perry@wdc.usda.gov; **Tish Toomer-Jones**, REAP Team Leader, phone 301-504-1233; **Lynn Knight**, phone 301-504-0393 [works on national statistics]; **Leroy Hall**, phone 301-504-0291 [works with Lynn Knight and Janet Perry].

Dana York, President, Green Earth Connections, LLC, 108 South Liberty Street, Centerville, MD 21617, phone 410-708-6794, email dyork818@yahoo.com [at the outset of this project, worked for the NRCS and was instrumental in promoting the dialogue between the USGS and the USDA that led to the signing of the 1619 Conservation Cooperator Agreements that support USGS access to conservation data for Chesapeake Bay farmlands].

U.S. Environmental Protection Agency (EPA)

Rich Batiuk, Associate Director for Science, U.S. Environmental Protection Agency, Chesapeake Bay Program Office, 410 Severn Avenue, Suite 109, Annapolis, MD 21403, phone 410-267-5731 or 1-800-968-7229 ext. 731, cell 443-223-7823, fax 410-267-5777, email batiuk.richard@epa.gov; Web sites www.chesapeakebay.net, www.epa.gov/chesapeake [chairs the Chesapeake Bay Program Partnership's BMP Verification Committee; responsible for bringing the CBP Partnership's BMP Verification Framework through the CBP Partnership's adoption and jurisdictional implementation; provided advice and input to this report].

Jeffrey S. Sweeney, Nonpoint Source Data Manager, U.S. Environmental Protection Agency, Chesapeake Bay Program Office, 410 Severn Avenue, Suite 109, Annapolis, MD 21403, phone 410-267-9844, email jsweeney@chesapeakebay.net [EPA model input coordinator, contributed to crosswalk development].

Kelly Shenk, Regional Agricultural Advisor, U.S. Environmental Protection Agency Region III, Chesapeake Bay Program Office, 410 Severn Avenue, Suite 3CB00, Annapolis, MD 21403, phone 410-267-5728, email shenk.kelly@epa.gov [provided advice and input to this report].

APPENDIX F

EPA Contractors and Grantees

Matthew Johnston, Nonpoint Source Data Analyst, University of Maryland/Chesapeake Bay Program Office, 410 Severn Avenue, Suite 112, Annapolis, MD 21403, phone 410-267-5707, email mjohnston@chesapeakebay.net [will be managing the 2013 Progress Submission for the Chesapeake Bay Program].

Martin Hurd, Business Analyst, Tetra Tech, 1800 Diagonal Rd., Ste. 500, Alexandria, VA 22304, phone 703-385-6000, email martin.hurd@tetratech.com [NEIEN coordinator, contributed to crosswalk development].

Vladimir Royzman, Business Analyst, Tetra Tech, U1800 Diagonal Rd., Ste. 500, Alexandria, VA 22304, phone 703-385-6000, email vladislav.royzman@tetratech.com [will be the NEIEN coordinator for the 2013 Progress Submission].

Mark Dubin, Agricultural Technical Coordinator, University of Maryland/Chesapeake Bay Program Office, 410 Severn Avenue, Suite 112, Annapolis, MD 21403, phone 410-267-9833, email mdubin@chesapeakebay.net [provided advice and input to this report].

State Agencies

Delaware

Marcia Fox, Delaware Department of Natural Resources and Environmental Control (DE-DNREC), 89 Kings Highway, Dover, DE 19901, phone 302-739-9939, email marcia.fox@state.de.us [responsible in 2013 for collecting data, aggregation, and submission to NEIEN].

Jennifer Volk, Environmental Quality and Management Specialist, University of Delaware, 69 Transportation Circle, Dover, DE 19901, phone 302-730-4000, email jennvolk@udel.edu [in 2012, worked for the DE-DNREC and was responsible for collecting data, aggregation, and submission to NEIEN].

Paul M. Petrichenko, Assistant State Conservationist, NRCS, Dover, DE, phone 302-678-4180 [as the NRCS State lead for agricultural conservation practice data, provided NRCS data to the DE-DNREC in previous years; in 2012, helped to review USDA aggregated data provided by the USGS and provide background clarifying information about practices and expected implementation levels].

Maryland

John Rhoderick, Administrator, Resource Conservation Operations, Maryland Department of Agriculture (MDA), Office of Resource Conservation, phone 410-841-5876, email John.Rhoderick@maryland.gov [coordinates MDA team responsible for data preparation (Beth Horsey, Mike Stanton, Dawn Bradley)].

Elizabeth [Beth] Horsey, Agricultural Watershed Implementation Plan Coordinator, MDA Office of Resource Conservation, phone 410-841-5865, email elizabeth.horsey@maryland.gov [assists in the review of progress reporting].

Mike Stanton, Agricultural Watershed Implementation Program Coordinator, MDA Office of Resource Conservation, phone 410-841-5879, email Michael.Stanton@maryland.gov [administers the Conservation Tracker database, assembles and prepares data for the NEIEN submission, and delivers aggregated data to Gregorio Sandi].

Dawn Bradley, Admin. Officer for Conservation Grants, MDA, phone 410-677-0802 ext. 3, or 410 -841-5946, email Dawn.Bradley@maryland.gov [manages MDA cover crop database].

Gregorio [Greg] Sandi, Natural Resources Planner, Environmental Science Services Administration, Maryland Department of the Environment (MDE), 1800 Washington Blvd., Baltimore, MD 21230, phone 410-537-3742, fax 410-537-3873, email gregoriosandi@maryland.gov [submits aggregated database to NEIEN, took over duties from Robin Pellicano in 2012].

Robin Pellicano, MDE, 410-537-4215, robinpellicano@maryland.gov [responsible for NEIEN submission prior to 2012].

APPENDIX F

New York

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Chris Yearick, GIS Specialist, Upper Susquehanna Coalition, Cornell Cooperative Extension Chemung County, 425 Pennsylvania Ave, Elmira, NY 14904, phone 607-734-4453, email cdy3@cornell.edu [manages database, submits aggregated data to NEIEN, collects data from Western districts].

Jacquelyn Lendrum, Research Scientist, New York Department of Environmental Conservation, phone 518-402-8165, email jmlendru@gw.dec.state.ny.us [will play a future role when responsibility for the NEIEN submission is transferred from the USC to the DEC].

Pennsylvania

Andy Zemba, Pennsylvania Department of Environmental Protection (PA-DEP), Office of Water Planning, Chesapeake Bay Program Director, P.O. Box 2063, 400 Market Street, 2nd Floor, Harrisburg, PA 17105-2063, phone 717-772-5633, email azemba@state.pa.us [supervises the PA-DEP's involvement with the Annual Progress Review].

Patricia A. Buckley, Chesapeake Bay Program Coordinator, Department of Environmental Protection (DEP)–Interstate Waters Office, Rachel Carson State Office Building, 400 Market Street, Harrisburg, PA 17101, phone 717-772-1675, email pbuckly@pa.gov [leading discussions to establish a 1619 Conservation Cooperator Agreement between the PA-DEP and NRCS].

Ted Tesler, Pennsylvania Department of Environmental Planning, Water Planning Office, Chesapeake Bay Program Technical Lead, P.O. Box 2063, 400 Market Street, 2nd Floor, Harrisburg, PA 17105-2063, phone 717-772-5621, email thtesler@state.pa.us [receives aggregated conservation data from conservation program leads and submits the data to the PA-DEP Information Technology Department, who upload annual data to the Pennsylvania NEIEN node].

Barry Evans, Research Associate, Penn State Institute of Energy and the Environment, Director, GIS Support Center, 128 Land and Water Research, University Park, PA, phone 814-865-3357, email bme1@psu.edu [works as a contractor to the PA-DEP to assemble the dataset and format it for the NEIEN interface].

Virginia

Fred Garst, GIS Specialist, NRCS, phone 540-434-1401 ext. 125, email Fred.Garst@va.usda.gov [queries NRCS IDEA database to provide unaggregated data to Bill Keeling].

William Keeling, Non-point Source Modeling and Data Coordinator, Virginia Department of Conservation and Recreation (VA-DCR), Division of Storm Water Management, 203 Governor St., Richmond, VA 23219, phone 804-371-7485, email William.Keeling@dcr.virginia.gov [received data from Fred Garst, flags and removes potential double counting, delivered aggregated data to Karl Huber; after June 2013, will be working for the VA-DEQ and so this process may need alteration if Bill can no longer receive 1619 access to confidential datasets].

Karl Huber, Virginia Department of Conservation and Recreation (VA-DCR), 203 Governor St., Richmond, VA 23219-2049, phone 804-786-4356, email Karl.Huber@dcr.virginia.gov [receives data from Bill Keeling, formats it for NEIN submission, and submits the data to the Annual Progress Review via node client software].

Beverly Quinlan, Geoinformatics Specialist, VA-DCR, 203 Governor St., Richmond, VA 23219-2049, phone 804-371-0297, email beverly.quinlan@dcr.virginia.gov [pulled State financial assistance data from the State database and prepared it for NEIEN submittal using node client software].

Blaine Delaney, Chesapeake Bay Coordinator/Emergency Watershed Protection Program Coordinator, NRCS, 1606 Santa Rosa Road, Suite 209, Richmond, VA, 23229-5014, phone 804-287-1663, email Blaine.Delaney@va.usda.gov, Web site http://www.va.nrcs.usda.gov [involved in developing Virginia data reporting strategy].

Wade Biddix, Assistant NRCS State Conservationist (Programs), 1606 Santa Rosa Road, Suite 209 Richmond, VA 23229-5014, phone 804-287-1675, email Wade.Biddix@va.usda.gov [Fred Garst's supervisor, involved in developing Virginia data reporting strategy].

West Virginia

Matt Monroe, West Virginia Department of Agriculture (WVDA) Assistant Director, Moorefield Environmental Programs (Moorefield Ag Complex), phone 304-538-2397 ext. 6860, email mmonroe@wvda.us [has 1619 access to USDA data, provides aggregated implementation data to Alana Hartman].

Alana Hartman, West Virginia Department of Environmental Protection (WVDEP), Division of Water and Waste Management, Environmental Resources Analyst, Non-Point Source Program (Chesapeake Bay lead), 22288 Northwestern Pike, Romney, WV 26757, phone 304-822-7266 ext. 3623, email Alana.C.Hartman@wv.gov [submits records to NEIEN, does not have 1619 access to unaggregated USDA data].

Carla Hardy, West Virginia Conservation Agency (WVCA) Watershed Program Coordinator, Moorefield Field Office, 60 C Industrial Park Road, Moorefield, WV 26836, phone 304-538-7581, email chardy@wvca.us [the WVCA had previously established a 1619 Conservation Cooperator Agreement covering only Animal Waste Management and Mortality Disposal in the Potomac Basin; that agreement expired in March 2013 and was not planned to be renewed].

Appendix B: 1619 Conservation Cooperator Agreements

[Files are downloadable from http://pubs.usgs.gov/of/2013/1287/]

1_MDA_NRCS_1619_MOU.pdf. This is the 1619 agreement currently in place between the USDA and MDA.

2_NY_USC_NRCS_1619_Compliance_Agreement.pdf. This is the 1619 agreement currently in place between the USDA and the Upper Susquehanna Coalition.

3_VA_DCR_NRCS_1619_Attachment_C.pdf. The 1619 agreement currently in place between the USDA and VA-DCR. This agreement is signed separately by each VA-DCR staff person that has access to the USDA data.

4_WV_DA_NRCS_1619_Compliance_Agreement.pdf. The 1619 agreement currently in place between the USDA and WV DA.

5_WV_CA_2012_NRCS_TMDL_MOU_animals_only.pdf. The original 1619 agreement established between the USDA and WVCA. This agreement was renewed in 2013.

6_USGS_FSA_Signed_Agreement.pdf. The 1619 agreement currently in place between the USDA and USGS for FSA data.

7_USGS_NRCS_Signed_Agreement.pdf. The 1619 agreement currently in place between the USDA and USGS for NRCS data.

8_USGS_FSA_NRCS_Data_Handling_Procedures_Olivia.pdf. Example of a USGS data handling procedures agreement, which is signed by each USGS employee with access to the USDA data.

9_2012_Approval_for_bilateral_sharing_of_data_with_states.pdf. Email confirmation from the USDA that it is acceptable for the USGS to share USDA conservation data with jurisdictional 1619 USDA Conservation Cooperators.

10_Template_USDA_Section_1619_Cooperator_Memorandum_of_Understanding_for_Chesapeake_Bay_Agencies_September_2013.docx. Template 1619 Memorandum of Understanding that is recommended by FSA for use by Chesapeake Bay Watershed Initiative cooperating agencies. It includes comprehensive language that any single agency can adopt, including text to limit data access to specific individuals within an agency.

Appendix C: USGS-USDA Data Requests

[Files are downloadable from http://pubs.usgs.gov/of/2013/1287/]

1_2012_USDA_Dataset_Field_Names.xlsx. List of data fields requested and received from the USDA in 2012.

2_2012_FSA_Data_Request.docx. Written data request for the 2012 FSA data including the Common Land Unit (CLU) and Conservation Reserve Program (CRP/CREP) farm records.

3_2012 _NRCS_Chesapeake_Bay_Data_Request.pdf. Written data request for 2012 NRCS data.

4_2013_FSA_Data_Request.docx. Written data request for 2013 FSA data.

5_2013_NRCS_Data_Request.pdf. Written data request for 2013 NRCS data, specifying field names.

Appendix D: USDA Practice Code Lookup Tables

[Files are downloadable from http://pubs.usgs.gov/of/2013/1287/]

1_FSA_and_NRCS_Practice_List.xlsx. List of practices, practice code, units, and lifespan. This file also includes the overlapping practices between NRCS and FSA.

2_FSA_NRCS_Practice_Decoder_and_References_043012.xlsx. Tables linking similar NRCS and FSA practices.

Appendix E: Crosswalk Between USDA Practice Codes and Scenario Builder

[File is downloadable from http://pubs.usgs.gov/of/2013/1287/]

2012_NEIEN_USDA_Crosswalk.xlsx. File contains a "crosswalk" that translates between USDA practice codes and 2012 CBP Partnership approved conservation practices as defined in the NEIEN Appendix A.8.11. All NRCS and FSA practices that are implemented in the Chesapeake Bay Watershed were added to the NEIEN Appendix A.8.11. The first worksheet is the Appendix A.8.11. The second worksheet includes the comparison between land-based FSA and NRCS practices and the Appendix ID Code to which those practices map. The third worksheet includes a similar comparison for animal practices.

APPENDIX F

APPENDIX F

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Appendix G. Enhance Collection and Reporting of Cost Shared Practices

The Bay Program's Agriculture Workgroup has identified opportunities to enhance the recordkeeping associated with USDA conservation practices in order to capture specific information that can be used to more efficiently integrate the data with jurisdictional datasets and to more accurately represent the practices in the Bay Program's Scenario Builder tool and in the various Bay Program's Chesapeake Bay watershed and water quality models. A number of USDA conservation practices are identified in Table G-1 and are described below as having substantial limitation in the amount of data available for translating between USDA conservation practice codes and Bay Program approved practice definitions. Other conservation practices not represented here may also have data limitations depending on their use and reporting. In many cases, these limitations could be addressed through simple techniques such as the use of modifying letter codes to distinguish among the various conservation techniques that fall within each practice code definition. The Bay Program's protocols generally assume the lowest available estimated load reductions for conservation practices whenever there is not detailed information available to support a higher conservation effectiveness estimate.

Table G-1: Possibilities for improved recordkeeping for USDA conservation practices. (Source: Hively et al. 2013)

Category	USDA code	Possibility		Relation to currently collected data
Land Use	Many	Record land use and land use change "from" and "to," and integrate datasets to make land use information consistently available in the National Conservation Planning (NCP) dataset.		NRCS has a data field for land use ID, but it is generally not populated in the NCP database. The change "from" and "to" are not available in any NRCS business tool.
Livestock Animal Type	Many	Record livestock animal type (for example, beef, dairy, poultry) for relevant conservation practices.		NRCS has a data field for livestock_ID in ProTracts, but in the 2012 dataset it was only sparsely populated in the NCP database.
Cover Crops	340	Record cover crop management details including species, planting date, planting method, commodity vs. regular, and if manure was applied (for example., commodity early drilled rye-aerial-no manure).		Cover crop is defined broadly in NRCS data, whereas the CBP applies nitrogen conservation effectiveness values that range from 5% to 45%, depending on management. This information is currently not available in any NRCS business tool, so Scenario Builder assigns conservative estimates for NRCS cover crops.
Fencing	382	Identify the location and use of the fencing, or the associated components of the management system.		NRCS currently defines, tracks, and reports livestock fencing under a single Conservation Practice Code (382). The practice Access Control could show where animals are excluded from stream corridor, but this currently is not in any current NRCS business tool.

Nutrient Management	590, 104/105	Differentiate various nutrient management planning and implementation strategies to match CBP definitions.		NRCS currently defines, tracks, and reports nutrient management under a single Conservation Practice code (590), and nutrient management plans are contracted as practice 104 (written) and 105 (applied).
Feed Management	592	Record the animal type, management strategy, and differentiate between nitrogen- vs. phosphorus-based feed management.		NRCS currently tracks and reports feed management under a single Conservation Practice code (592) for multiple livestock species and does not typically track the type and amount of manure nutrient reductions resulting from changes in feed management.
Forestry Practices	CP-22	Record length and width of the buffer rather than acreage. Indicate consistently and accurately if a buffer is re-enrolled vs. newly installed.		Forest buffers are currently tracked by FSA in units of acres. Including length and width would take into account different load reductions for narrower vs. wider buffers. Double counting could be avoided if FSA indicates consistently and accurately whether a buffer is re-enrolled vs. newly installed.
Tillage Practices	324, 329, 345, 346, 761, 778	Include the residue cover amount in the practice standard to indicate minimum percent of cover remaining after harvest.		Current NRCS practice standards for tillage do not include a minimum amount of residue remaining after harvest. CBP Expert Panels have found that water quality benefits for tillage practices vary greatly depending on the amount of cover, and jurisdictions can more accurately show improvement if they have this information.

The NRCS is currently undertaking a Conservation Delivery Streamlining Initiative (CDSI) and has plans to integrate the NCP and IDEA data systems. Similarly, the FSA is reengineering its conservation practice database under the Modernize and Innovate the Delivery of Agricultural Systems (MIDAS). It will be important to maintain the level of discussion and collaboration achieved in 2012 and 2013 to smoothly integrate these expected changes with jurisdictional datasets and facilitate data transfer between State and Federal agencies.

The BMP Verification Committee recommends continued close collaboration with NRCS and FSA on working to enhance data collection and reporting in the areas identified below and in Table G-1. NRCS has committed to taking advantage of the opportunities afforded the Bay Program through the CDSI to work to address the needs identified by the Bay Program's Agriculture Workgroup.

The following text extracted, from Hively et al. 2013, with permission of the authors, provides clear examples of where limitations in NRCS and FSA data collection are directly impacting the ability of the six Chesapeake Bay watershed states to get full credit for their farmers implemented agricultural conservation practices.

Land Use and Livestock Animal Type

Limitation: The NRCS currently has fields in its data collection system for land use and livestock type, associated with a variety of conservation practices. However, these data fields were rarely populated in the 2012 NRCS dataset provided to the USGS from the NCP database. The Bay Program's BMP definitions place practices in the context of land use (for example, pasture fencing receives a reduction only when applied to riparian areas).

Opportunities: Populating the data fields for land use and livestock type could allow the six watershed jurisdictions to receive more accurate crediting for many different conservation practices whenever conservation practice efficiency in reducing nutrient and sediment loads is modified by land use (for example, farm headquarters, forest, crop/hay, range/pasture) or animal type (for example, manure management, feed management). Currently, default values are assigned to unreported elements by using conservative effectiveness values. Although populating these fields would represent additional effort on the part of NRCS staff, the benefit could be more accurate recognition of increased pollutant load reductions from agricultural lands.

The current land-use and animal-type information may possibly exist in other NRCS datasets such as the IDEA system, in which case the problem becomes one of linking the data to the NCP records rather than ensuring data entry in the Service Center Offices. The land use changes "from" and "to" do not presently exist in NRCS databases, only the current land use. The livestock animal type is available in ProTracts, but is not in Toolkit or the field is not populated in the NCP database. The number of animals or animal units associated with a livestock conservation practices could also be useful for obtaining full nutrient conservation credits in the Bay Program's water-quality models. [Note: data for land use and livestock types were successfully acquired in October 2013 by USGS. This acquisition was made possible by changes in the NRCS database that fully linked the land use and livestock type to the practice implementation data. However, numerous cases of missing land use and livestock type data entries persisted.]

Cover Crops

Limitation: The NRCS currently defines, tracks, and reports cover crops under a single conservation practice code (340) and standard. The Bay Program currently defines cover crops by four attributes (species, planting method, timing of planting, and harvest strategy) to determine their effectiveness in reducing the loss of nutrients and sediments to the environment. In particular, the NRCS lumps leguminous cover crop types with all cover crops. The Bay Program does not currently consider leguminous cover crops as having a nitrogen benefit since they fix nitrogen in the soil. These additional attributes presently are not currently available in any NRCS business tool.

Opportunities: Enhancements to record keeping for the USDA conservation practice code for cover crops that could track and report additional management details identifying all four cover crop attributes, or even a single attribute such as species, could allow the six watershed jurisdictions to receive more accurate crediting of cover crops and more thorough representation in the Bay Program's models. In the Bay Program's Scenario Builder tool, conservative default values are assigned to unreported elements when clarifying information is

not available. At present, NRCS staff have indicated that they are unlikely to track cover crops with more specificity because the present system does not allow for enhancements to record keeping.

Fencing

Limitation: The NRCS currently defines, tracks, and reports fencing practices under a single conservation practice code (382) and standard, whereas the Bay Program's Scenario Builder tool defines the nutrient benefits associated with fencing as a component of the management change the practice creates. Examples include the establishment of riparian buffers versus rotational grazing of livestock.

Opportunities: Enhancements to recordkeeping for the USDA conservation practice code for fencing that could identify the location and use of the fencing, or the associated components of the management system, could allow for better utilization within the CBP water-quality models. One example would be to link riparian forest buffers (391), riparian herbaceous cover (390), or stream crossings (578) by using a modifier to the fencing code representing riparian fencing. For grazing and pasture management improvements, the fencing code could be linked with prescribed grazing (528) or animal trails and walkways (575). Other conservation practices that potentially could be associated with fencing-related agricultural land management changes include watering facilities (614) and spring developments (574). The Pennsylvania State Office for USDA-NRCS has been investigating opportunities to enhance data collection for conservation practice code 382 (fence) through linkage to associated conservation management practices. The NRCS maintains a practice code for access control (472) where animals are excluded from the stream corridor, but the other information is not currently present in any NRCS business tool.

Nutrient Management

Limitation: The NRCS currently defines, tracks, and reports nutrient management under a single conservation practice code (590) and standard, with additional codes for Comprehensive Nutrient Management (304) and Nutrient Management Planning (104, 105). The Bay Program currently defines nutrient management under three management levels including crop group nutrient application management, enhanced application nutrient management, and decision/precision agricultural nutrient application management, with different associated effectiveness values for reducing nutrient losses to the environment. The 'crop group nutrient application management' category was recently developed to replace the former category of nitrogen-based nutrient management. The Bay Program is also currently reviewing the enhanced and decision/precision nutrient application management practices, and will likely revise the definitions for these practices so they are more focused on the use of field-scale nutrient applications.

Opportunities: Enhancements to recordkeeping for the USDA conservation practice codes for nutrient management that could more readily identify differences among the three tiers of practice categories, and allow for improved data utilization by the jurisdictional partners and within the Bay Program's models. The new nutrient management standards for practice 590 standards have substantially expanded the categories of nutrient management that are eligible

for NRCS technical support, but without an associated identifying code that can be used for reporting. Nutrient management plans for cropland are contracted as NRCS activities 104 (written) or 105 (applied) using a single practice code, which does not allow for differentiation among the planning strategies identified in the Bay Program's nutrient management planning definitions. An example of possible practice code enhancements was developed by the Maryland State Office of USDA-NRCS to track and report multiple (four) nutrient management categories through the use of a letter suffix to the conservation practice code.

Feed Management

Limitation: The NRCS currently defines, tracks, and reports feed management under a single conservation practice code (592) and standard for multiple livestock species and does not typically track and report the type and amount of manure nutrient reductions resulting from changes in feed management. Feed management systems can focus on nitrogen and phosphorus individually or in combination, leading to different results. The Bay Program defines feed management effectiveness as the change in pounds of nitrogen and phosphorus reduced in a particular animal type's manure as a result of the reduction or enhancement of feed nutritional components.

Opportunities: Enhancements to recordkeeping for the USDA conservation practice code for feed management that could identify differences in feed management focused on nitrogen and phosphorus separately or in combination, and could track and report changes in manure nutrient concentrations as a result of the practice, could allow for improved data utilization by the jurisdictional partners and within the Bay Program's water-quality models. Associated livestock type and number could also be useful. The Pennsylvania State Office of USDA-NRCS has taken the initiative to obtain copies of farm feed management plans and to work with agricultural technical service providers to record and analyze theses data and enable tracking of the results. This information is currently not available in any NRCS business tool.

Forestry Practices

Limitation: Forest buffers are tracked by the FSA in units of acres. As part of the 2007 Forest Directive[1] adopted by the Bay Program's Chesapeake Executive Council, forest buffer goals were established and are tracked by length and width of stream miles buffered, rather than acres. Also, in the FSA CRP/CREP database, the distinction between new forest buffers versus re-enrollment of existing forest buffers is not recorded consistently, so avoiding double counting can be difficult.

Opportunities: Jurisdictions provide the length and width of implemented forest buffers to the Bay Program's Forestry Workgroup for assessment of goal achievement. However, jurisdictions rely on the FSA data for reporting to the Bay Program's Annual Progress Review. The tracking of forest buffer length and width by the FSA could provide more precise information that could take into account different load reductions for narrower versus wider buffers (for example, 35 feet versus 100 feet). In addition, potential double counting between historic and current implementation could be avoided if the FSA were to record consistently

[1] http://www.chesapeakebay.net/content/publications/cbp_27761.pdf

and accurately whether a buffer was re-enrolled as opposed to newly installed. A similar issue of re-enrollment may exist for land retirement.

Wetlands

Limitation: The NRCS currently defines, tracks, and reports wetland conservation practices under four separate conservation practice codes (644, 658, 657, and 659) and standards. The Bay Program currently defines wetland conservation practice efficiencies on the basis of a single practice of wetland restoration that includes restoration, enhancement, or creation of wetlands, and distinguishes between streamside and other areas. The NRCS practice definition includes *Phragmites* spraying for invasive weed control, whereas the Bay Program's BMP definition does not accommodate *Phragmites* spraying. The Bay Program is addressing this discrepancy through its Wetlands Workgroup.

Opportunities: Enhancements to the Bay Program's practice definitions for wetlands could enable more accurate calculation of nutrient and sediment loads associated with the variety of NRCS wetland conservation practices and could allow for improved data utilization by the jurisdictional partners and within the Bay Program's Chesapeake Bay watershed and estuarine water quality models.

Tillage

Limitation: The NRCS tillage practice definitions do not define the minimum amount of residue remaining on the field. All Bay Program approved tillage BMPs include a minimum residue coverage percent. This is because water-quality benefits are most tied to the residue coverage.

Opportunities: Refine the NRCS tillage practice definitions to include the minimum residue coverage. Because a high degree of soil cover dramatically increases water infiltration and storage and decreases soil erosion and soil-bound nutrient losses, encouraging the use of tiers of residue management could benefit water-quality conditions.

CHESAPEAKE BAY PROGRAM

RESOURCE IMPROVEMENT PRACTICE

DEFINITIONS AND VERIFICATION VISUAL INDICATORS

REPORT

Presented by the Agriculture Workgroup's Resource Improvement Technical Review Panel:

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August 2014

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Introduction

As Chesapeake Bay states implement local Watershed Implementation Plans to meet the new Total Maximum Daily Load requirements for the Chesapeake Bay Watershed, a more accurate accounting of all conservation measures on agricultural lands is critical to ensure that appropriate nutrient load reductions are being credited in the Bay Watershed Model. Traditionally, states have relied upon both State and Federal Cost-Share Programs as the source of conservation implementation data for progress to report in their Watershed Implementation Plans.

Recognizing that many conservation measures have been, and are being, implemented without Federal or State financial assistance, the Chesapeake Bay Program has agreed to credit Best Management Practices that meet CBP or NRCS definitions and standards and Resource Improvement Practices that have been implemented without public cost-share funds provided they are providing a reduction of sediment and nutrients to the Chesapeake Bay. This document will provide the process for identification and verification of these two types of practices.

Objective

The objective of this Report is to provide what is required for the collection and verification of non-cost-shared agricultural best management practices that meet CBP definitions and establish definitions and verifications methods for Resource Improvement Practices**.** The goal is to account for all verified farmer implemented conservation practices that result in nutrient and sediment reductions. In order for practices to be counted in the Bay Model, data will have to be tracked, verified and reported and then transmitted to the Chesapeake Bay Program via the National Environmental Information Exchange Network (NEIEN).

The process of identifying Non-cost shared practices will normally happen when local Conservation District or other trained technical staffs are on farms working with cooperators and landowners assisting them with the planning process to correct any potential environmental concerns that the landowner may have. It is extremely important for technical staff to establish a dialogue with landowners to encourage the proper use and maintenance of all BMPs. It is the intent of this document is to provide guidance for jurisdictions to develop verification protocols for the reporting all non cost-shared conservation practices for crediting toward progress in their state Watershed Implementation Plans.

Why Is It Important To Report Non Cost shared BMP's?

- **Farmers and Agricultural Landowners** voluntarily install many BMP's outside of state or federal cost share programs or cannot accept a government subsidy:
  - ✓ Plain Sect Farmers (Amish, Mennonite Farmers as examples)
  - ✓ Farms owned by corporations that cannot accept federal funding due to the payment limitations.
- **Some state nutrient regulations** require farmers to install practices that provide water quality protection and need to be verified for compliance with state laws. These state requirements may result in practices that are not required to meet NRCS Standards and Specifications:
  - ✓ Stream Exclusion (fencing type or distance from stream)
  - ✓ 10' and 35' buffers for fertilizer and manure application setbacks
- **Watershed Organizations, Environmental Organizations, Conservation Organizations, and NGOs** are all helping Farmers and Agricultural Landowners to meet WIP goals to protect water quality by installing BMPs:
  - ✓ Shenandoah RC&D Council - Stream exclusion fencing with narrow width tree plantings
  - ✓ Nanticoke Watershed Alliance – 10' Buffers on Drainage Ditches
  - ✓ Chester River Association - Switch grass plantings for field buffers
  - ✓ Mid-Shore Riverkeeper Conservancy - Water Control Structures on Field Ditches

Non Cost-Shared Practices that Provide Resource Improvement

Resource Improvement Best Management Practices (RI) are non-cost shared BMPs that are typically financed by the operator or other non-public entity or source and may or may not meet the practice standards associated with federal and state cost-share programs. RI practices may lack the contractual provisions of cost-shared BMPs as well as the corresponding implementation and maintenance oversight. ***"Resource Improvement BMP's are practices which provide similar annual environmental benefits for water quality but may not fully meet all the design criteria of existing governmental design standards. RI BMP's are usually identified during a visit with the farmer. RI BMP's are implemented by a farmer and are not cost shared through a federal or state program. RI BMP's can be the result of a farmer choosing not to completely follow all the details of the design standard from the District or NRCS, but will contain all the critical elements for water quality resource improvement. Approved CBP RI BMP's definitions contain descriptions of the practice with Visual Indicators. A Visual Indicator is a means of assessing the presence of key elements that must be present to achieve the water quality benefits of the RI practice and to be reported in Jurisdictional WIPs. The re-verification interval of an agricultural Resource Improvement BMP may be more frequent than practices meeting state or federal programs to insure proper functioning."***

Resource Improvement Practices are Multi-Year Visual Assessment Practices

The Resource Improvement Practices (RI) discussed in this Report fall under Visual Assessment BMPs - Multi-Year Practices in the Chesapeake Bay Program Partnership Agricultural Workgroup's "Agricultural BMP Verification Guidance". These are practices can be visually assessed and have a protracted physical presence on the landscape, i.e., of more than one year when properly maintained and operated.

Verification and Quality Assurance of Non Cost-Shared Practices

Currently the Chesapeake Bay Program (CBP) can accept non-cost shared practices that fully meet NRCS practice standards and address CBP BMP definitions for credit. This Report further develops definitions and suggested methods to verify and document the existence of Resource Improvement Practices (RI), non-cost shared practices, which do not fully address all NRCS practice standards but do comply with appropriate CBP BMP definitions. Each state will develop a method to verify and document these two types of non-cost shared practices and include it in their State Jurisdictional Protocols. Jurisdictions will utilize approved AgWG recommended quality assurance methods and frequency for spot-checking all non-cost shared and RI practices per The Chesapeake Bay Program Partnership Agricultural Workgroup's Agricultural BMP Verification Guidance.

How Were Resource Improvement Practices and Visual Indicators Developed?

The development of Resource Improvement Practices started in July of 2013 with the Maryland Department of Agriculture requesting that their "Non Cost-Shared Management Practice Verification Procedures Manual" be approved by the AgWG. The November 2013 version of their verification document was the original document the Technical Panel reviewed and used for the development of this Report. The process for the development of this Report included the following actions by MDA and the Technical Panel:

1) Starting in 2011, through the review of practices that farmers have installed without cost sharing, the Maryland Department of Agriculture determined there were fourteen practices that they considered to be what was first called Functional Equivalent Practices (FE). MDA's first verification procedures manual (Version 1) created documentation worksheets that consisted of open ended and fill-in the blank questions. Upon review by MDA, it was determined at this method of documentation resulted in wide variations in interpretation and what was reported as a FE Practice. Note: Virginia also conducted a trial of collecting Non-Cost shared practices in 6 Districts, but did not provide any information to the Panel for this process.

2) MDA worked with representative Conservation Districts to develop Versions 2 and 3 of the MDA Non-Cost Shared Verification Manual. It included a new FE worksheet that contained NRCS practice design criteria and FE design criteria. It was tested and updated from input by the representative Conservation Districts in Maryland.
3) MDA presented this document to the AgWG in July 2013 and the Partnership endorsed the concept and requested approval from Water Quality Goal Implementation Team (WQGIT). The WQGIT requested that the AgWG work through a technical review process for final approval. The AgWG then requested a Partnership Technical Review Panel be created to review the MDA document and provide recommendations back to the AgWG for final approval.
4) AgWG sent out a notice to the jurisdictions for Technical Review Panel member nominations. In this notice, the AgWG requested technically qualified members from State Agencies, Conservation Districts, NRCS technical personal and the NGO Community. States submitted nominees and NRCS agreed to participate as technical members in an advisory role (See letter from Rich Sims in Appendix A). December 12, 2013, the AgWG selected Technical Review Panel members.
5) The Technical Review Panel held a teleconference January 29, 2014 to receive an introduction to the issue and their panel charge.
6) The Technical Review Panel met in person on March 2, May 8, 2014 and then held a May 29, 2014 teleconference for working sessions to develop the definitions and documentation checklists for the practices. During these sessions, the following overall document changes were made:

a) Change in name from Functional Equivalents (FE) to Resource Improvement Practices (RI)
b) Change FE Criteria test to Visual Indicators (VI), following the WQGIT approved process developed by the Storm Water Sector for verification of homeowner BMPs.
c) The NRCS design criteria were removed from the documentation checklists. The NRCS Practice standards will only be used as a reference practices along with CBP BMPs for assistance in identifying if a practice should be reported and a Non-Cost Shared Practice that meets a NRCS standard or a RI.
d) Final definitions and VI's for each practice were developed.
e) Two practices were deleted: Concentrated Area Protection and Wetland Development. It is recommended by the Technical Review Panel that these two be provided back to the appropriate CBP program Expert Panel or Sector for assistance on the development of an appropriate RI practice.
f) It was decided to make a jurisdictional neutral document and recommendations were made on the appropriate Agricultural Verification BMP Methods, documentation requirements and re-verification for RI practices using the Agricultural Workgroup's Agricultural BMP Verification Guidance (July 2014).

7) The document was presented by the Technical Panel to the AWG for review on June 19, 2014.
8) Comments were provided by the AWG members and the Technical Panel reviewed and incorporated or made changes to the RI documents as appropriate July 10, 2014 and July 25, 2014.
9) The document was approved by the AgWG on August 8, 2014.
10) The document was approved the WTWG and the WQGIT on August 11, 2014.
11) The final approved document provided for jurisdictions in August 2014.
12) Jurisdictions that choose to report RI's will develop the specified guidance and will get approval the appropriate CBP approval process. If states propose additional RIs they will need the appropriate AgWG and CBP approval.
13) CBP approved RI practices will be collected by approved jurisdictional verification processes and reported through NEIEN for credit in the Jurisdictional TMDL Watershed Improvement Plan progress runs.

Resource Improvement Practices and Visual Indicator Requirements

RI Practices and Visual Indicators (VI) meet the follow requirements:

a) RI and their associated VI's are usually found as part of a state or NGO entity working with farmers. They typically would not be designed by Agencies or NGOs, but by the farmer who has an interest in resolving a conservation water quality problem on their farm and they implemented a RI to meet that need. To receive credit for the practice, the VI's for each RI are required to be present and are verified by

an approved CBP Verification Method with the appropriate documentation provided to the certifying agency for approval before credit is provided in Jurisdictional WIPs (see Matrix in Appendix B)
b) VI's will meet the appropriate federal, state and local regulations.
c) VI's provide for the safe functioning of the practice for humans or animals.
d) VI's will provide water quality or resource improvement as implemented.
e) Some RI standards will have more than one reportable code to record the appropriate buffer widths, vegetation or type of animal, or animal units, etc. (See Appendix C- Animal Units)
f) Nutrient Exclusion Areas that are less than CBP Buffer widths (i.e. <35') are will receive "land use change" credit only as previously approved by the AgWG.
g) RI practice names, units and CBP credit will be finalized through the appropriate NEIEN Appendix process and timelines to be credited to the Jurisdiction WIP.
h) All RI practices have reduced re-verification intervals and must be recertified to ensure they are being properly maintained and functioning.

How are Visual Indicators Evaluated and Recorded?

In the process of working with a farmer, RI practices may be mentioned by the farmer or discovered by the technical specialist during a farm visit. Jurisdictions may use any approved AgWG verification method (See Appendix B) to determine if the practice will meet the RI definitions and VI's. In order for a RI practice to be considered reportable the technical specialist will look at the RI practice Visual Indicators and see if they are present. All Visual Indicators must either have a Y or NA marked. If a N is marked on the checklist, the technical specialist may not report the RI practice, but they may use the opportunity to discuss the deficiency with the farmer.

Jurisdictional Checklist Requirements

Jurisdictions may use any format or design (i.e. paper, electronic, etc.) for their state checklist to document if the practice meets an approved RI definition and all elements of a RI are present with appropriate VI's. The Checklists that are included in this Report are one example of recording all the elements required for RI verification documentation.

Jurisdictional RI checklist will contain the following information for each RI:

1) Date of verification and name of certifying official;
2) Landowner information: such as address, county, etc.;
3) Location of RI on the landscape such as: marking on an aerial map or conservation plan map, GPS location or Latitude/Longitude coordinates, etc.;
4) Presence of the required VIs (as appropriate);
5) Date the practice was installed by the farmer;
6) Appropriate reported units for state database and NEIEN;
7) Visual documentation such as a photo of the practice, drawing or other description;
8) Other notes as needed for additional documentation or re-verification.

The RI checklist and associated information will be placed the farmer's conservation plan or other jurisdictional approved location.

Modifications to Approved VI's: Upon CBP partnership approval, jurisdictions are allowed to make individual VI's stricter than the approved definition per state program requirements, regulations, etc. Where "state or local regulations or requirements" are mentioned, jurisdictions may insert specific state regulation or requirement references in the VI. A jurisdiction may not make a VI less restrictive or weaker than found in the CBP approved Report. If jurisdictions wish to propose less restrictive VI's or additional RI's, they must be first reviewed and approved following the AgWG and CBP approval process.

Who can report RI practices?

RI BMPs may be reported by using any approved AgWG Verification method (See Appendix B). Any trained and/or certified technical field staff person that has the required knowledge and skills to determine if the practice meets the applicable RI definition and VIs may conduct the RI practice review. Jurisdictions will have final oversight and will be the certifying entity of all information that is provided and approved for entry into the CBP NEIEN reporting system. The appropriate spot-checking will be completed during annual Quality Assurance Reviews and the appropriate actions will be taken if information submitted is incorrect such as: removal of RI practice from reporting system; potential re-training of technical staff; removal of certification of the individual, NGO or other entities that may report RI's, etc.

RI BMP Re-verification

RI practices shall be re-verified at a more frequent interval since their design may not be as extensive as similar state funded or NRCS practices Therefore a technical person must visit the RI BMP on a more frequent basis to review the efficacy of the RI BMP and the farmer's operation and maintenance of the BMP. RI re-verification intervals are found in the below table. When a jurisdiction re-verifies the practice it must determine if required VIs are still present and functioning for the appropriate water quality credit or it will be removed from the jurisdictional and NEIEN database.

RI BMP Re-verification Intervals:

RI BMP Name	RI Re-Verification Intervals (Years)
Dry Waste Storage Structure	5
Animal Compost Structure	5
Alternative Crop/Switchgrass	5
Watercourse Access Control (Narrow, Grass, Trees)	5
Grass Nutrient Exclusion Area on Watercourse and Grass Buffer on Watercourse	5
Forest Nutrient Exclusion Area on Watercourse and Forest Buffer on Watercourse	10
Vegetative Environmental Buffer for Poultry, Grass	3
Vegetative Environmental Buffer for Poultry, Trees	5
Conversion to Pasture or Hayland	3
Rotational Grazing	3
Barnyard Clean Water Diversion	5
Water Control Structure	5
Watering Trough	5

Resource Improvement Practices

There are 19 Resource Improvement Practices. Some practices have multiple options for different widths or vegetation:

	Resource Improvement Practice Name	Additional Practice Information
RI-1	Dry Waste Storage Structure	
RI-2	Animal Compost Structure	
RI-3	Alternative Crop/Switchgrass	
RI-4a	Watercourse Access Control-Narrow Grass	10'-34' Width Exclusion Area, Natural Grass or planted
RI-4b	Watercourse Access Control-Narrow Trees	10'-34' Width Exclusion Area, Native Trees or planted
RI-5	Watercourse Access Control-Grass	35'+ Width Exclusion Area, Natural or planted Grass
RI-6	Watercourse Access Control-Trees	35'+ Width Exclusion Area, Natural or planted Trees
RI-7	Grass Nutrient Exclusion Area on Watercourse	10'-34' Width Nutrient Exclusion Area
RI-8	Grass Buffer on Watercourse	35'+ Width Buffer
RI-9	Forest Nutrient Exclusion Area on Watercourse	10'-34' Width Nutrient Exclusion Area
RI-10	Forest Buffer on Watercourse	35'+ Width Buffer
RI-11	Vegetative Environmental Buffer for Poultry-Grass	Warm Season Grass
RI-12	Vegetative Environmental Buffer for Poultry-Trees	Trees
RI-13	Conversion to Pasture	
RI-14	Conversion to Hayland	
RI-15	Rotational Grazing	
RI-16	Barnyard Clean Water Diversion	
RI-17	Water Control Structure	
RI-18	Watering Trough	

RI-1: DRY WASTE STORAGE STUCTURE Resource Improvement Practice Definition

Reported Units: Number of Systems; Animal Type; Animal Units

DEFINITION

A waste storage structure for dry stackable manure constructed by fabricating a structure, or by fabricating a field-stacking pad. This does not include the temporary stacking of poultry manure in a field that would be moved to different locations each year.

PURPOSES

To temporarily store dry stackable manure.

CONDITIONS WHERE PRACTICE APPLIES

To temporarily store dry stackable manure.

CRITERIA

Size of the facility should be large enough to store all accumulated dry animal manure, for the maximum period during which such wastes cannot be applied to the land for reasons such as operational restrictions, weather, or crops.

Storage of stackable manure must meet all state and local regulations. All runoff is controlled and non-polluting.

Exclude clean runoff to the fullest extent practical.

Waste handling equipment shall be available to remove waste materials from agricultural waste storage facility and apply it to the land at the locations, times, and rates per local, county or state regulations.

OPERATION AND MAINTENANCE

Re-verification of animal waste structures is required at least every 5 years for practices meeting RI specifications.

SUPPORTING DATA AND DOCUMENTATION

Complete accompanying checklist; Visual Documentation of the practice (picture or drawing); and document on conservation plan map or aerial photo of farm.

Reference Practices: CBP- Animal Waste Management Systems (AWMS); NRCS -313 Waste Storage Facility

RI-1: Dry Waste Storage Structure Example Checklist Verification Date:

Cooperator Name, Address, and Phone #	FSA Farm / Tract Field Number:	SCD	Inspection Type ☐ Initial Inspection ☐ QA Spot Check ☐ Re-verify ☐ Other _____

	RI-1 Practice: Dry Waste Storage Structure				Supporting Data & Documentation:
	Re-Verification Interval: 5 years	Y	N	N/A	
	RI-1 Visual Indicators				
1	Does facility operate without polluting waters?				Visual observation
2	Facility is located ≥ 100' from wells, unless there is a Health Dept. waiver or per State, County or Local Regulation				Estimate by paces
3	Facility is 100 feet from top of bank of any stream or per state, county or local regulation.				Estimate by paces
4	Volume per sizing sheet for NRCS Spec or describe management methodology used by farmer				Owner interview
5	Offsite runoff is excluded or accounted for in storage				Visual observation
6	Storage of stackable manure must meet all state and local regulations. All runoff is controlled and non-polluting.				Visual observation and Owner interview
7	No safety concerns present.				Visual observation
8	Slab on grade, or may be other stabilized impervious surface.				Visual observation
9	Retaining wall if used is straight, not in imminent danger of failure				Visual observation
	Meets RI-1 Visual Indicators				
	RI-1 Installation Date:				
	RI-1 Reportable Units:				
	Number of Systems:				
	Animal Type: AU:				
	CERTIFICATION DATE/INITIALS:				
	RE-VERIFICATION DATE/INITIALS:				

All Visual Indicators must either have a Y or NA marked. If an N is marked on the checklist, the RI may not be reported until the deficiency is addressed.

Additional Notes/Documentation about RI:

RI-2: ANIMAL COMPOST STRUCTURE Resource Improvement Practice Definition

Reported Units: Number of Systems; Animal Type; Animal Units

DEFINITION

An on-farm facility for the treatment or disposal of livestock and poultry carcasses for a small numbers of animals. (Typically less than 80 Animal Units total on the farm)

PURPOSES

Provide proper disposal of carcasses to decrease non-point source pollution of surface and groundwater resources.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies where animal carcass treatment or disposal must be considered as a component of a waste management system for livestock or poultry operations. This practice includes disposal of normal, not catastrophic, animal mortality.

CRITERIA

The facility shall be designed to handle normal mortality.

Contaminated runoff from any mortality facility without a roof must be controlled.

The appropriate carbon source to animal carcass volume is utilized resulting in appropriate biological decomposition.

Leachate should not occur from any composting facility.

Operators should receive proper training on the use of the facility.

OPERATION AND MAINTENANCE

Re-verification of animal mortality facilities is required at least every 5 years for practices meeting RI specifications.

SUPPORTING DATA AND DOCUMENTATION

Complete accompanying checklist; Visual Documentation of the practice (picture or drawing); and document on conservation plan map or aerial photo of farm.

Reference Practices: CBP- Mortality Composters (MortalityComp); NRCS- 316 Animal Mortality Facility

RI-2: Animal Compost Structure Example Checklist Verification Date:

Cooperator Name, Address, and Phone #	FSA Farm / Tract Field Number:	SCD	Inspection Type ☐ Initial Inspection ☐ QA Spot Check ☐ Re-verify ☐ Other _____

	RI-2 Practice: Animal Compost Structure				Supporting Data & Documentation:
	Re-Verification Interval: 5 years	Y	N	N/A	
	RI-2 Visual Indicators				
1	Does facility operate without polluting waters?				Visual observation
2	Facility is located ≥ 100' from wells, unless there is a Health Dept. waiver or per State, County or Local Regulation				Estimate by paces
3	Facility is 100 feet from top of bank of any stream or per state, county or local regulation.				Estimate by paces
4	Facility meets pollution control requirements of state & local agencies and regulations				Visual observation
5	The appropriate carbon source to animal carcass volume was utilized resulting in appropriate biological decomposition.				Visual observation
6	The resulting product is utilized according to state and local regulations				Owner Interview
	Meets RI-2 Visual Indicators				
	RI-2 Installation Date:				
	RI-2 Reportable Units:				
	Number of Systems:				
	Animal Type: AU:				
	CERTIFICATION DATE/INITIALS:				
	RE-VERIFICATION DATE/INITIALS:				

All Visual Indicators must either have a Y or NA marked. If an N is marked on the checklist, the RI may not be reported until the deficiency is addressed.

Additional Notes/Documentation about RI:

RI-3: ALTERNATIVE CROP/SWITCHGRASS Resource Improvement Practice Definition

Reported Unit: Acres

DEFINITION

Conversion of cropland to a herbaceous alternative crop of switchgrass.

PURPOSES

Improve water quality and sequester atmospheric carbon dioxide; Promote desired plant growth; improve or provide wildlife habitat.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to alternative crops plantings of switchgrass on land that was previously used for crop production.

This practice does not apply to plantings that are intended to function primarily as field borders, hedgerows, or riparian buffers, for which other standards are applicable.

OPERATION AND MAINTENANCE

Re-Verification of the alternative crop are required at least every 5 years for practices meeting RI specifications.

SUPPORTING DATA AND DOCUMENTATION

Complete accompanying checklist; Visual Documentation of the practice (picture or drawing); and document on conservation plan map or aerial photo of farm.

Reference Practices: CBP- AlternativeCrop (CarSeqAltCrops); NRCS-327 Conservation Cover

RI-3: Alternative Crop/Switchgrass Example Checklist Verification Date:

Cooperator Name, Address, and Phone #	FSA Farm / Tract Field Number:	SCD	Inspection Type ☐ Initial Inspection ☐ QA Spot Check ☐ Re-verify ☐ Other _____

	RI-3 Practice: Alternative Crop/Switchgrass				Supporting Data & Documentation:
	Re-Verification Interval: 5 years	Y	N	N/A	
	RI-3 Visual Indicators				
1	Pure switchgrass planting				Visual Observation
2	Appropriate lime & fertilizer applied per state regulations				Owner Interview
3	Livestock are excluded				Visual Observation
4	75% switchgrass cover is present				Visual Observation
	Meets RI-3 Visual Indicators				
	RI-3 Installation Date:				
	RI-3 Reportable Units:				
	Acres:				
	CERTIFICATION DATE/INITIALS:				
	RE-VERIFICATION DATE/INITIALS:				

All Visual Indicators must either have a Y or NA marked. If an N is marked on the checklist, the RI may not be reported until the deficiency is addressed.

Additional Notes/Documentation about RI:

RI-4a,4b,5,6: WATERCOURSE ACCESS CONTROL Resource Improvement Practice Definition

Reported Units: Feet Length, Feet Width

RI Code	RI BMP Name	Additional Practice Information
RI-4a	Watercourse Access Control-Narrow Grass	10'-34' Width Exclusion Area, Natural Grass or planted
RI-4b	Watercourse Access Control-Narrow Trees	10'-34' Width Exclusion Area, Native Trees or planted
RI-5	Watercourse Access Control-Grass	35'+ Width Exclusion Area, Natural or planted Grass
RI-6	Watercourse Access Control-Trees	35'+ Width Exclusion Area, Natural or planted Trees

DEFINITION

A constructed barrier to livestock. A field border will be present of either herbaceous materials or trees between the watercourse and the barrier or fence. The RI grass or tree exclusion area width behind the barrier will be either 10 to 34 feet, or 35 feet or greater.

PURPOSES

This practice is to prevent, restrict, or control access of livestock into surface water or environmentally sensitive areas.

CONDITIONS WHERE PRACTICE APPLIES

This practice may be applied on any area adjacent to surface water or environmentally sensitive areas where the control of livestock is needed. Fences are not required where natural barriers or other methodologies will meet this purpose.

CRITERIA

The barrier shall be appropriately installed and maintained sufficient to control or restrict the access of livestock.

The minimum buffered width between barrier and surface water and or environmentally sensitive area shall be no less than 10 feet measured horizontally on a line perpendicular to the water body, beginning at the top of bank. In order to adequately address water quality, the buffer width may need to be expanded to include important resource features such as wetlands, steep slopes, areas that are occasionally or seasonally flooded, or critical habitats. Vegetation in the buffer between the barrier and surface water should be of a density to help reduce sediment, organic material, nutrients, pesticides and other pollutants in surface runoff.

OPERATION AND MAINTENANCE

Fencing materials, if used, shall be of high quality and durability, and constructed to meet the intended purpose of the practice.

Re-verification of the barrier is required at least every 5 years for practices meeting RI specifications.

SUPPORTING DATA AND DOCUMENTATION

Complete accompanying checklist; Visual Documentation of the practice (picture or drawing); and document on conservation plan map or aerial photo of farm.
Reference Practices: CBP Stream Access Control with Fencing (PastFence), Tree Planting (TreePlant), Streamside Grass Buffers (GrassBuffersTrp), Streamside Forest Buffers (ForestBuffersTrp)' NRCS-382 Fence, 472 Access Control

RI-4a, 4b,5,6: Watercourse Access Control Example Checklist Verification Date:

Cooperator Name, Address, and Phone #	FSA Farm / Tract Field Number:	SCD	Inspection Type ☐ Initial Inspection ☐ QA Spot Check ☐ Re-verify ☐ Other _____

	RI-4,5,6 Practice: Watercourse Access Control				Supporting Data & Documentation:
	Re-Verification Interval: 5 years	Y	N	N/A	
	RI-4,5,6 Visual Indicators				
1	Exclusion method controls the intended animals				Owner interview Visual Observation
2	Livestock concentration and grazing are minimized in riparian (wetland, stream) areas				Visual Observation
3	If fencing is used then there is a 10' minimum setback from the top of bank of watercourse				Estimate by paces
4	Areas around fence are stabilized				Visual Observation
5	Vegetation in buffer between the barrier and surface water should be of a density to help reduce sediment, organic material, nutrients, pesticides and other pollutants in surface runoff.				Visual Observation
6	Exclusion method is determined to be critical to confinement/exclusion from environmental area				Visual Observation
	Meets RI-4,5,6 Visual Indicators				
	RI Installation Date:				
	RI-4a,4b,5,6 Reportable Units: Feet				
	Check RI Reporting and Record Length in Feet:				
	RI-4a: 10'-34' – Narrow-Width Access Control, Natural Grass or planted Length Feet: Width Feet:				
	RI-4b: 10'-34' – Narrow-Width Access Control, Native Trees or planted Length Feet: Width Feet:				
	RI-5: 35'+ Width Access Control, Natural or planted Grass Length Feet: Width Feet				
	RI-6: 35'+ Width Access Control, Natural or planted Trees Length Feet: Width Feet				
	CERTIFICATION DATE/INITIALS:				
	RE-VERIFICATION DATE/INITIALS:				

All Visual Indicators must either have a Y or NA marked. If an N is marked on the checklist, the RI may not be reported until the deficiency is addressed.

Additional Notes/Documentation about RI:

RI-7,8: GRASS NUTRIENT EXCLUSION AREA or BUFFER on Watercourse Resource Improvement Practice Definition

Reported Units: Feet Length, Feet Width

RI Code	RI BMP Name	Additional Practice Information
RI-7	**Grass Nutrient Exclusion Area on Watercourse**	10'-34' Width Nutrient Exclusion Area
RI-8	**Grass Buffer on Watercourse**	35'+ Width Buffer

DEFINITION

Grasses, grass-like plants, and forbs that are established **on converted cropland** that receive no nutrients and are managed to provide a herbaceous buffer located **adjacent to and up-gradient** from water bodies or a strip or area of herbaceous vegetation that inhibits nutrients and sediment from overland flow located adjacent to cropland. This includes areas that function as nutrient exclusion area or riparian herbaceous buffers.

PURPOSES

This practice is to create a nutrient exclusion area or buffer, reduce excess amounts of sediment, organic material, nutrients, pesticides and other pollutants in surface runoff and reduce excess nutrients and other chemicals in shallow ground water flow and to increase carbon storage in plant biomass and soils.

CONDITIONS WHERE PRACTICE APPLIES

This practice qualifies if applied on cropland on stable areas adjacent to permanent or intermittent streams, ditches and tidal waters**. It may only be reported on cropland without a fence (otherwise see RI-4 or RI-5 Watercourse Exclusion)**. Exclusion areas will be 10 to 34 feet, or buffers of 35 feet or greater.

CRITERIA

To create a grass nutrient exclusion area or buffer, reduce excess amounts of sediment, organic material, nutrients, pesticides and other pollutants in surface runoff and reduce excess nutrients and other chemicals in shallow ground water flow.

For areas adjacent to surface water, the minimum width shall be at least 10 feet measured horizontally on a line perpendicular to the water body, beginning at the top of bank or wetland edge. There should be at least 75% perennial grass cover. In order to adequately address water quality, the buffer width may need to be expanded to include important resource features such as wetlands, steep slopes, areas that are occasionally or seasonally flooded, or critical habitats. Plant and animal pest species shall be controlled to the extent feasible to achieve and maintain the intended purpose of the vegetative cover. Noxious weeds shall be controlled as required by state law.

OPERATION AND MAINTENANCE

Re-verification of the grass exclusion areas or buffers is required at least every 5 years for practices meeting RI specifications. Control concentrated flow or mass soil movement up gradient of the exclusion area or buffer to maintain function. Species shall have stiff stems and high stem density near the ground surface.

SUPPORTING DATA AND DOCUMENTATION

Complete accompanying checklist; Visual Documentation of the practice (picture or drawing); and document on conservation plan map or aerial photo of farm.

Reference Practices: CBP- Land Retirement to Hay Without Nutrients (LandRetireHYO), Grass Buffers; Vegetated Open Channels for Agriculture (GrassBuffers); NRCS-390 Riparian Herbaceous Cover

RI-7,8: Grass Nutrient Exclusion Area or Buffer on Watercourse Example Checklist

Verification Date:

Cooperator Name, Address, and Phone #	FSA Farm / Tract Field Number:	SCD	Inspection Type ☐ Initial Inspection ☐ QA Spot Check ☐ Re-verify ☐ Other _____

	RI-7,8 Practice: Grass Nutrient Exclusion Area or Buffer on Watercourse				Supporting Data & Documentation:
	Re-Verification Interval: 5 years	Y	N	N/A	
	RI-7,8 Visual Indicators				
1	Horizontal buffer width ≥ 10', measured perpendicular to top-of-bank intermittent stream, ditch or tidal area				Estimate by paces
2	Width is ≥ 35' if receiving dissolved contaminants (e.g. nutrients, pesticides)				Estimate by paces Visual Observation
3	Overland flow through buffer is maintained as sheet flow				Visual Observation
4	All excessive sheet-rill and concentrated flow are controlled in areas immediately adjacent & up gradient of buffer, before entering				Visual Observation
5	No livestock are present nor have access				Visual Observation Owner Interview
6	Plant species are native (preferred), or introduced and non-invasive, with stiff stems and high stem density				Visual Observation
7	Plants are compatible in growth rate, tolerant of flooding/saturation and shade				Visual Observation
8	Minimum of 75% perennial grass cover is present				Visual Observation
	Meets RI-7,8 RI Visual Indicators				
	RI Installation Date:				
	RI-7,8 Reportable Units: Feet				
	Check RI Reporting and Record Length in Feet:				
	RI-7: 10'-34' Width Nutrient Exclusion Area Length Feet: Width Feet:				
	RI-8: 35'+ Width Buffer Length Feet: Width Feet:				
	CERTIFICATION DATE/INITIALS:				
	RE-VERIFICATION DATE/INITIALS:				

All Visual Indicators must either have a Y or NA marked. If an N is marked on the checklist, the RI may not be reported until the deficiency is addressed.

Additional Notes/Documentation about RI:

RI-9,10: FOREST NUTRIENT EXCLUSION AREA or BUFFER on Watercourse Resource Improvement Practice Definition

Reportable Units: Feet Length, Feet Width

RI Code	RI BMP Name	Additional Practice Information
RI-9	Forest Nutrient Exclusion Area on Watercourse	10'-34' Width Nutrient Exclusion Area
RI-10	Forest Buffer on Watercourse	35'+ Width Buffer

DEFINITION

An area predominately trees and/or shrubs established **on converted cropland** located adjacent to and up-gradient from streams, ditches or tidal waters.

PURPOSES

This practice is to create a nutrient exclusion area, reduce excess amounts of sediment, organic material, nutrients, pesticides and other pollutants in surface runoff adjacent to streams.

CONDITIONS WHERE PRACTICE APPLIES

This practice qualifies if applied on stable areas adjacent to permanent or intermittent streams, ditches or tidal water. **It may only be reported on converted cropland without a fence (otherwise see RI-4 or RI-6 Watercourse Access Control).** Exclusion areas will be 10 to 34 feet, buffers will be 35 feet or greater.

CRITERIA

To create a forested nutrient exclusion area or buffer, reduce excess amounts of sediment, organic material, nutrients, pesticides and other pollutants in surface runoff.

The minimum width shall be at least 10 feet measured horizontally on a line perpendicular to the water body, beginning at the top of bank or wetland edge. In order to adequately address water quality, the buffer width may need to be expanded to include important resource features such as wetlands, steep slopes, areas that are occasionally or seasonally flooded, or critical habitats. Dominant vegetation (>50% canopy cover) consists of existing, naturally regenerated, or planted trees and/or shrubs.

OPERATION AND MAINTENANCE

Re-verification of the forested nutrient exclusion area/buffers is required at least every 10 years for practices meeting RI specifications.

Control concentrated flow or mass soil movement up gradient of the forested nutrient exclusion areas or buffers to maintain function.

Manage the dominant canopy to maintain maximum vigor of over story and understory species.

SUPPORTING DATA AND DOCUMENTATION

Complete accompanying checklist; Visual Documentation of the practice (picture or drawing); and document on conservation plan map or aerial photo of farm.

Reference Practices: CBP- Tree Planting (TreePlant), Forest Buffers (ForestBuffers); NRCS-391 Riparian Forest Buffer

RI-9,10: Forest Exclusion Area or Buffer on Watercourse Example Checklist Verification Date:

Cooperator Name, Address, and Phone #	FSA Farm / Tract Field Number:	SCD	Inspection Type ☐ Initial Inspection ☐ QA Spot Check ☐ Re-verify ☐ Other _____

	RI-9,10 Practice: Forest Nutrient Exclusion Area or Buffer on Watercourse				Supporting Data & Documentation:
	Re-Verification Interval: 10 years	Y	N	N/A	
	RI-9,10 Visual Indicators				
1	Dominant vegetation (>50% canopy cover) consists of existing, naturally regenerated, or planted trees and/or shrubs				Visual Observation
2	Perpendicular distance from top-of-bank of steam, ditch or tidal area ≥ 10' minimum average for width of buffer				Estimate by paces
3	Overland/sheet flow through buffer is maximized (no concentrated flow)				Visual Observation
4	Structural measures are present where vegetation practice is insufficient to control erosion				Visual Observation
	Meets RI-9,10 Visual Indicators				
	RI Installation Date:				
	RI-9,10 Reportable Units: Feet				
	Check RI Reporting and Record Length in Feet:				
	RI-9: 10'-34' Width Nutrient Exclusion Area Length Feet: Width Feet:				
	RI-10: 35'+ Width Buffer Length Feet: Width Feet:				
	CERTIFICATION DATE/INITIALS:				
	RE-VERIFICATION DATE/INITIALS:				

All Visual Indicators must either have a Y or NA marked. If an N is marked on the checklist, the RI may not be reported until the deficiency is addressed.

Additional Notes/Documentation about RI:

RI-11,12: VEGETATIVE ENVIRONMENTAL BUFFER FOR POULTRY (Grass or Trees) Resource Improvement Practice Definition

Reportable Units: Feet Length, Feet Width

RI Code	RI BMP Name	Additional Practice Information
RI-11	Vegetative Environmental Buffer for Poultry-Grass	Warm Season Grass
RI-12	Vegetative Environmental Buffer for Poultry-Trees	Trees

DEFINITION

Vegetative Environmental Buffers are a minimum of two staggered rows of trees/ shrubs or warm season grasses in linear configurations adjacent to poultry house fans.

PURPOSES

This practice applies to buffers around poultry operations that are designed to improve air and water quality by reducing and intercepting airborne particulate matter.

CONDITIONS WHERE PRACTICE APPLIES

This practice may be applied on any area where linear plantings of woody plants or warm season grasses are desired and are suitable for the intended purpose.

Vegetative Environmental Buffers are generally not used solely for purposes of enhancing aesthetics or providing wildlife habitat. These are usually secondary purposes that may complement a primary purpose.

Consider that water and air quality benefits may arise from using vegetative environmental buffers to intercept airborne particulates and to trap sediment-attached substances. Vegetative environmental buffers may also benefit air and water quality by assimilating plant nutrients in leaves and roots.

This practice does not apply to plantings that are intended to function primarily as field borders, or riparian forest buffers, for which other standards are applicable.

CRITERIA

Plant species shall be selected based on the planned purpose(s) of the vegetative environmental buffer, preferences of the client, and conditions of the site.

Use staggered spacing in multiple row plantings. Vegetative environmental buffers may be established using trees, shrubs, and/or perennial bunch grasses producing erect stems attaining avg. heights of at least 3 feet and persisting over winter.

OPERATION AND MAINTENANCE

Re-verification of the vegetative environmental buffers is required at least every 3 for grass buffers and 5 years for tree buffers for practices meeting RI specifications.

SUPPORTING DATA AND DOCUMENTATION

Complete accompanying checklist; Visual Documentation of the practice (picture or drawing); and document on conservation plan map or aerial photo of farm.

Reference Practices: CBP- Grass (None), Tree Planting: Vegetative Environmental Buffers Poultry (TreePlant); NRCS-422 Hedgerow Planting

RI-11,12: Vegetative Environmental Buffer for Poultry Example Checklist Verification Date:

Cooperator Name, Address, and Phone #	FSA Farm / Tract Field Number:	SCD	Inspection Type ☐ Initial Inspection ☐ QA Spot Check ☐ Re-verify ☐ Other _____

	RI-11,12 Practice: Vegetative Environmental Buffer for Poultry (grass or trees)				Supporting Data & Documentation:
	Re-Verification Interval: 3 years for grass or 5 years for trees	Y	N	N/A	
	RI-11,12Visual Indicators				
1	Plant species are trees, shrubs, and/or perennial bunch grasses ≥ 3' tall				Visual Observation
2	Used for poultry house ventilation-outlet filtering and must be living and within 100' of fans.				Visual Observation
3	Hedgerow is ≥ 2 rows wide. Row vegetation heights should be: 1'-2' (bunch grass), 2'-4' (shrubs), 6'-12' (deciduous trees), 6'-10' (evergreen trees) as appropriate.				Visual Observation
4	If using trees, one row should contain deciduous trees and the other evergreen trees.				Visual Observation
5	Livestock are controlled or excluded				Visual Observation Owner interview
6	Hedgerow is located between poultry house and sensitive areas if appropriate. Use N/A if no sensitive area.				Visual Observation
7	Hedgerows plants will be staggered with no gaps greater than 1' when fully mature.				Visual Observation
	Meets RI-11,12 Visual Indicators				
	RI Installation Date:				
	RI-11,12 Reportable Units: Acres				
	RI-11=Warm Season Grass Length Feet: Width Feet:				
	RI-12=Trees/Shrubs Length Feet: Width Feet:				
	CERTIFICATION DATE/INITIALS:				
	RE-VERIFICATION DATE/INITIALS:				

All Visual Indicators must either have a Y or NA marked. If an N is marked on the checklist, the RI may not be reported until the deficiency is addressed.

Additional Notes/Documentation about RI:

RI-13,14: CONVERSION TO PASTURE OR HAYLAND Resource Improvement Practice Definition

Reportable Units: Acres

DEFINITION

Conversion of cropland to pasture or hayland for the purpose of forage production through the establishment of native or introduced forage species.

PURPOSES

This practice may be applied to establish forage species for the purposes of forage production, primarily intended for grazing or harvesting, which may balance forage supply, reduce soil erosion and improve water quality.

CONDITIONS WHERE PRACTICE APPLIES

This practice may be applied on cropland or other agricultural lands where forage production is feasible or desired. This only applies where grazing or harvesting is the primary consideration.

CRITERIA

Select forage species for planting based on the intended use, realistic yield goals, maturity stages, compatibility with other species, and level of management that the client is willing and able to provide. This is intended for multi-year hay crops with a minimum life span of at least 3 years.

Select plants that will provide adequate perennial ground cover of at least 75% cover, root mass, and resistance to water flow when site conditions require erosion protection.

Removal of herbage should be consistent with site production limitations, rate of plant growth, and the physiological needs of specific forage plants to maintain plant reserves for regrowth, winter survival, and drought survival.

OPERATION AND MAINTENANCE

Re-verification of the plantings is required at least every 3 years for practices meeting RI specifications.

SUPPORTING DATA AND DOCUMENTATION

Complete accompanying checklist; Visual Documentation of the practice (picture or drawing); and document on conservation plan map or aerial photo of farm.

Reference Practices: CBP- Land Retirement to Pasture (LandRetirePast), Land Retirement to Hay Without Nutrients (LandRetireHYO); NRCS- 512 Forage and Biomass Planting

RI-13,14: Conversion to Pasture or Hayland Example Checklist Verification Date:

Cooperator Name, Address, and Phone #	FSA Farm / Tract Field Number:	SCD	Inspection Type ☐ Initial Inspection ☐ QA Spot Check ☐ Re-verify ☐ Other _____

	RI-13,14 Practice: Conversion to Pasture or Hayland				Supporting Data & Documentation:
	Re-Verification Interval: 3 years	Y	N	N/A	
	RI-13,14 Visual Indicators				
1	Lime & fertilizer rates are applied according to state regulations				Owner Interview
2	75% perennial grass cover is established and maintained as “pasture or hayland in good condition"				Visual Observation
3	Plants are either native or non-invasive introduced				Visual Observation
	Meets RI-13,14 Visual Indicators				
	RI Installation Date:				
	RI-13,14 Reportable Units: Acres				
	RI-13=Conversion to Pasture Acres:				
	RI-14=Conversion to Hayland Acres:				
	CERTIFICATION DATE/INITIALS:				
	RE-VERIFICATION DATE/INITIALS:				

All Visual Indicators must either have a Y or NA marked. If an N is marked on the checklist, the RI may not be reported until the deficiency is addressed.

Additional Notes/Documentation about RI:

RI-15: Rotational Grazing Resource Improvement Practice Definition

Reported Units: Acres

DEFINITION

Managing the controlled harvest of vegetation with grazing animals.

PURPOSES

This practice utilizes a range of pasture management and grazing techniques to improve the quality and quantity of the forages grown on pastures and reduces the impact of animal travel lanes, animal concentration areas or other degraded areas.

CONDITIONS WHERE PRACTICE APPLIES

This practice may be applied as a part of conservation management system to achieve one or more of the following:

- Improve or maintain desired species composition and vigor of plant communities.
- Improve or maintain quantity and quality of forage for grazing animals' health and productivity.
- Improve or maintain surface and/or subsurface water quality and quantity.
- Improve or maintain riparian and watershed function.
- Reduce accelerated soil erosion, and maintain or improve soil condition.

CRITERIA

Frequency and intensity of grazing shall be managed to promote ecologically and economically stable plant communities (of at least 75% perennial grass cover) that meet the producer's objectives. Use stubble height target levels in conjunction with monitoring to help ensure that resource conservation and producer objectives are met.

Minimize concentrated livestock areas, trailing, and trampling to reduce soil compaction, excess runoff and erosion. Pasture fencing layouts shall provide laneways that are least prone to livestock trail erosion and provide protection to sensitive areas, such as wetlands.

Provide all livestock on pasture with free access to clean water.

OPERATION AND MAINTENANCE

Apply prescribed grazing on a continuing basis throughout the occupation period of all grazing units. Adjust intensity, frequency, timing and duration of grazing and/or browsing to meet the desired objectives for the plant communities and the associated resources, including the grazing and/or browsing animal.

Manage kind of animal, animal number, grazing distribution, fencing, length of grazing and/or browsing periods and timing of use to provide grazed plants sufficient recovery time to meet planned objectives. The recovery period of non-grazing can be provided for the entire year or during the growing season of key plants.

Re-verification of the grazing system is required at least every 3 years for practices meeting RI specifications.

SUPPORTING DATA AND DOCUMENTATION

Complete accompanying checklist; Visual Documentation of the practice (picture or drawing); and document on conservation plan map or aerial photo of farm.

Reference Practices: CBP- Prescribed Grazing (PrecRotGrazing); NRCS-528 Prescribed Grazing

RI-15: Rotational Grazing Example Checklist Verification Date:

Cooperator Name, Address, and Phone #	FSA Farm / Tract Field Number:	SCD	Inspection Type ☐ Initial Inspection ☐ QA Spot Check ☐ Re-verify ☐ Other _____

	RI-15 Practice: Rotational Grazing				Supporting Data & Documentation:
	Re-Verification Interval: 3 years	Y	N	N/A	
	RI-15 Visual Indicators				
1	75% perennial grass cover is maintained in all grazing areas through the appropriate use of fencing as needed				Visual Observation
2	Livestock have limited (restricted) access to streams, seeps, ponds, and other surface waters in compliance with state regulations				Visual Observation
3	Livestock have close access to clean water, which meets their average daily water requirements				Visual Observation
4	Grazing system (watering, feeding and HUA's) minimizes erosion and protects sensitive areas				Visual Observation
5	Nutrient Management is applied in accordance with state regulations				Owner Interview
6	Owner has a grazing objective for all grazing units and manages the grass height				Visual Observation of grass height and Owner Interview
7	Landowner has a plan for movement of animals to maintain appropriate forage cover				Owner Interview
	Meets RI-15 Visual Indicators				
	RI-15 Installation Date:				
	RI-15 Reportable Units:				
	Acres:				
	CERTIFICATION DATE/INITIALS:				
	RE-VERIFICATION DATE/INITIALS:				

All Visual Indicators must either have a Y or NA marked. If an N is marked on the checklist, the RI may not be reported until the deficiency is addressed.

Additional Notes/Documentation about RI:

RI-16: BARNYARD CLEAN WATER DIVERSION Resource Improvement Practice Definition

Reported Unit: Number of Systems

DEFINITION

This practice includes the installation of practices to control clean water runoff from barnyard areas, such as roof runoff control, diversion of clean water from entering the barnyard and control of runoff from barnyard or poultry barn areas. This is not associated with dirty water that requires treatment before release.

PURPOSES

To prevent roof runoff water from mixing with barnyard wastes and/or to divert clean water away from the barnyard or areas of heavy animal concentration to prevent erosion or pollutants (nutrients, sediment, and animal wastes) from reaching the waters of the State.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to situations where roof runoff or clean water needs to be diverted away from structures, poultry houses or contaminated areas, such as barnyards or other concentrated animal areas. Such structures include, but are not limited to, erosion-resistant channels or subsurface drains with rock-filled trenches along building foundations below eaves, roof gutters, downspouts, and appurtenances.

CRITERIA

Roof gutters should have a minimum top width of 5 inches and supports no greater than 24 inch spacing.

All downspouts, gutters and outlets should be protected from damage by livestock and equipment.

The water from roof runoff structures may empty into surface drains or underground outlets, or onto the ground surface and should be directed away from foundations, structures or contaminated areas.

Stone filled trenches with an underground outlet, under the roof drip line, may be used in lieu of roof gutter. Locate the trench so the trench centerline follows the roof drip line.

OPERATION AND MAINTENANCE

Inspect collection and storage devices, valves, outlets and pipelines at least biannually. Make repairs as needed.

Re-verification of the barnyard or poultry barn runoff control structures is required at least every 5 years for practices meeting RI specifications.

SUPPORTING DATA AND DOCUMENTATION

Complete accompanying checklist; Visual Documentation of the practice (picture or drawing); and document on conservation plan map or aerial photo of farm.

Reference Practices: CBP- Barnyard Runoff Control (BarnRunoffCont); NRCS-558 Roof Runoff Structure

RI-16: Barnyard Clean Water Diversion Example Checklist Verification Date:

Cooperator Name, Address, and Phone #	FSA Farm / Tract Field Number:	SCD	Inspection Type ☐ Initial Inspection ☐ QA Spot Check ☐ Re-verify ☐ Other _____

	RI-16 Practice: Barnyard Clean Water Diversion				Supporting Data & Documentation:
	Re-Verification Interval: 5 years	Y	N	N/A	
	RI-16 Visual Indicators				
1	Surface outlet is stable; downspouts have elbow and dissipation device directed away from buildings, as appropriate.				Visual Observation
2	Gutter-less system has stone-filled, collection trench under entire roof drip line: width ≥ 24", depth ≥ 24"				Visual Observation Owner interview
3	Drip line stone extends along sides of and over pipe				Visual Observation
4	Gutter is K-style, half-round or box-type on good-condition vertical fascia board, free floating on supports, and ≥ 5" top width. Roof rafter ends are sound				Visual Observation
5	Downspout avoids mix with waste				Visual Observation
6	The system is sound and functioning				Visual Observation
7	Downspouts are securely fastened @ top & bottom, with intermediate supports ≤ 10', installed appropriately				Visual Observation
8	Gutter & downspout are protected from livestock. Otherwise made of steel pipe, Sch40, or similar				Visual Observation
9	Clean surface runoff is directed away from barnyard area				Visual Observation
	Meets RI-16 Visual Indicators				
	RI-16 Installation Date:				
	RI-16 Reportable Units:				
	Number of Systems:				
	CERTIFICATION DATE/INITIALS:				
	RE-VERIFICATION DATE/INITIALS:				

All Visual Indicators must either have a Y or NA marked. If an N is marked on the checklist, the RI may not be reported until the deficiency is addressed.

Additional Notes/Documentation about RI:

RI-17: WATER CONTROL STRUCTURE Resource Improvement Practice Definition

Reported Unit: Number of Systems

DEFINITION

A structure in a water management system that conveys water, controls the direction or rate of flow, maintains a desired water surface elevation in **drainage ditches for water de-nitrification purposes.**

PURPOSES

The purpose of this practice is to reduce nutrient loading from agricultural drainage systems into downstream receiving waters.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies wherever a permanent structure is needed as an integral part of a water control system to serve one or more of the following functions:

1. To control the elevation of water in drainage or irrigation ditches. Typical structures: checks, flashboard risers, check dams.

2. To control the water table level, remove surface or subsurface water from adjoining land, flood land for frost protection or manage water levels for wildlife or recreation. Typical structures: water level control structures flashboard risers, pipe drop inlets, and box inlets

3. To provide silt management in ditches or canals. Typical structure: sluice.

CRITERIA

Structures should be designed and installed consistent with all federal and state rules and regulations.

The structure capacity shall be appropriate for the intended practice or purpose.

The structure shall be fenced, if necessary, to protect the vegetation from grazing livestock.

Protect outlets to the extent that design flows will not result in erosion downstream of the structure.

OPERATION AND MAINTENANCE

Structures will be checked and necessary maintenance, including removal of debris, shall be performed after major storms and at least semiannually. Water level management and timing shall be adequately described wherever applicable.

Re-verification of the water control structure is required at least every 5 years for practices meeting RI specifications.

SUPPORTING DATA AND DOCUMENTATION

Complete accompanying checklist; Visual Documentation of the practice (picture or drawing); and document on conservation plan map or aerial photo of farm.

Reference Practices: CBP- Water Control Structures (WaterContStruc); NRCS-587 Structures for Water Control

RI-17: Water Control Structure Example Checklist Verification Date:

Cooperator Name, Address, and Phone #	FSA Farm / Tract Field Number:	SCD	Inspection Type ☐ Initial Inspection ☐ QA Spot Check ☐ Re-verify ☐ Other _____

	RI-17 Practice: Water Control Structure				Supporting Data & Documentation:
	Re-Verification Interval: 5 years	Y	N	N/A	
	RI-17 Visual Indicators				
1	No active erosion on ditch banks or at the structure				Visual Observation
2	Structure has no effect on septic filter fields				Visual Observation
3	No un-approved backwater on neighbors				Visual Observation
4	Structure complies with applicable federal, state and local regulations				Visual Observation
5	Outlet is protected if necessary				Visual Observation
6	Inlets have non-clog trash rack if needed				Visual Observation
7	Structure is function correctly and managed for intended use				Visual Observation
	Meets RI-17 Visual Indicators				
	RI-17 Installation Date:				
	RI-17 Reportable Units:				
	Number of Systems:				
	CERTIFICATION DATE/INITIALS:				
	RE-VERIFICATION DATE/INITIALS:				

All Visual Indicators must either have a Y or NA marked. If an N is marked on the checklist, the RI may not be reported until the deficiency is addressed.

Additional Notes/Documentation about RI:

RI-18: WATERING TROUGH Resource Improvement Practice Definition

Reported Unit: Number of Systems

DEFINITION

A permanent or portable device to provide an adequate amount and quality of drinking water for livestock.

PURPOSES

To provide watering facilities which will bring about the desired protection of vegetative cover to prevent erosion and pollutants (nutrients, sediment, and animal wastes) from reaching the waters of the State. The primary purpose is not to provide livestock water, but to improve animal distribution to protect water quality.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to all land uses where there is a need for alternative watering facilities for livestock. The source of water supplied to the facilities can be from any source including pipelines, spring developments, water wells, and ponds.

CRITERIA

Locate facilities to promote even grazing distribution and reduce grazing pressure on sensitive areas.

Provide fencing as necessary to exclude livestock from sensitive areas and encourage use of facility.

Locate as far away from streams and drainage ways as practical.

Design the watering facility to provide adequate access for the animals planned to use the facility.

Install troughs on sites that are well drained, or provide drainage.

OPERATION AND MAINTENANCE

Inspect collection and storage devices, valves, outlets and pipelines at least biannually. Make repairs as needed.

Check valves, automatic water level devices, and overflow pipes for proper operation as appropriate.

Re-verification of the watering facilities is required at least every 5 years for practices meeting RI specifications.

SUPPORTING DATA AND DOCUMENTATION

Complete accompanying checklist; Visual Documentation of the practice (picture or drawing); and document on conservation plan map or aerial photo of farm.

Reference Practices: CBP- Off Stream Watering Without Fencing (OSWnoFence); NRCS-614 Watering Facility

RI-18: Watering Trough Example Checklist Verification Date:

Cooperator Name, Address, and Phone #	FSA Farm / Tract Field Number:	SCD	Inspection Type ☐ Initial Inspection ☐ QA Spot Check ☐ Re-verify ☐ Other _____

	RI-18 Practice: Watering Trough				Supporting Data & Documentation:
	Re-Verification Interval: 5 years	Y	N	N/A	
	RI-18 Visual Indicators				
1	There is an adequate water supply				Owner interview
2	Area around trough does not create a resource concern				Visual Observation
3	Automatic water level control is functioning without overtopping				Visual Observation
4	Overflow is piped to acceptable outlet				Visual Observation
5	Backflow prevention is installed and working, where connected to wells, domestic or municipal water systems and meets state and local regulations				Visual Observation
	Meets RI-18 Visual Indicators				
	RI-18 Installation Date:				
	RI-18 Reportable Units:				
	Number of Systems:				
	CERTIFICATION DATE/INITIALS:				
	RE-VERIFICATION DATE/INITIALS:				

All Visual Indicators must either have a Y or NA marked. If an N is marked on the checklist, the RI may not be reported until the deficiency is addressed.

Additional Notes/Documentation about RI:

Appendix A: USDA, NRCS Letter of Support

USDA
United States Department of Agriculture

MAR 2 0 2014

SUBJECT: Chesapeake Bay Functional Equivalent Technical Review Panel

TO: Jack Bricker, Virginia State Conservationist
Denise Coleman, Pennsylvania State Conservationist
Jon Hall, Maryland State Conservationist
Don Pettit, New York State Conservationist
Kasey Taylor, Delaware State Conservationist
Kevin Wickey, West Virginia State Conservationist

File Code: 120

The issues surrounding counting and assigning value to conservation treatments and practices in the Chesapeake Bay Model are important. Clearly all efforts towards conservation on the land have some value. The outcome of this effort, as we understand it, is to further define and credit voluntary non-cost shared treatment on the land by accurately assessing and accounting for this treatment. Establishing a measure of credit in the Bay Model for voluntary non-cost shared treatment would be the next step.

The NRCS members of the review panel are being tasked with:

A) Reporting of non-cost shared practices that meet NRCS standards:
   1) How do you develop a distinct definition for a non-cost shared practice that meets NRCS standards that is more descriptive than what the Bay program currently has?

   2) How do you document that it has been verified?

B) Defining "functionally equivalent" practices. Once you settle on the "definition", each state will also have to develop a method to verify these and document procedure.

Guidance: NRCS Standards are described in the "Field Office Technical Guide." Conservation practices identified as implemented in Toolkit meet NRCS standards. At a minimum this requires NRCS employees or partners with specific Job Approval Authority (JAA). NRCS fully support the jurisdictions effort to identify freestanding non-cost shared conservation practices that meet NRCS standards and allowing them to receive "credit" in the Bay model in the same manner as cost-shared practices.

Specific conservation practices require significant engineering or management with technical assistance. After the fact installation (without technical assistance) of conservation practices, would seriously hamper any effort to verify if a conservation treatment meets standards and specs. This does not disallow some form of credit and it is within the full purview of the jurisdiction to determine the credit. These conservation treatments should not be associated as meeting NRCS standard and specs.

Natural Resources Conservation Services
1400 Independence Ave., SW Room 5204
Washington, DC 20250
Voice: 202-690-2196
An Equal Opportunity Provider and Employer

Summary:

- We believe that this proposal is in alignment with Executive Order 12508 on the Chesapeake Bay in which USDA agreed to assist states to get a full accounting of conservation practices both cost and non-cost shared practices (sometimes called voluntary practices) that have been implemented in the Bay Region.

- NRCS is not funded or staffed appropriately to have an authentication or validation role for freestanding conservation treatments.

- We are willing to discuss this effort in an advisory capacity to achieve comprehensive Bay model credit for applied conservation treatment of identified resource concerns. This includes the consideration of human concerns toward achieving sustainable agriculture; consideration for the effects of planned actions on interrelated geographical areas within Bay watershed; and identifying areas where knowledge, science, and technology need to be advanced.

- As stated above, the issues surrounding counting and assigning value to conservation treatments and practices in the Chesapeake Bay Model are important. All efforts achieving conservation on the land have some value and should be identified by the jurisdictions.

Richard Sims
Regional Conservationist, Northeast

James E. Tillman, Sr.
Regional Conservationist, Southeast

cc:
Leonard Jordan, Associate Chief for Conservation, Washington, DC
Martin Lowenfish, Team Leader, Initiatives, Washington, DC

APPENDIX B: Verification Methods/RI Practices and Documentation

Agricultural BMP Verification Methods	Assessment Method	Verification Expectation	Resource Improvement (Non-Spec)	Eligible RI Practices	Documentation Necessary
1.) Permit Issuing Programs	Verified compliance with federal NPDES (CAFO) or state agricultural operational permit program requirements.	Non-annual frequency of permit compliance inspections for all or sufficient statistical percentage of permitted operations during permit life span. Review of office/farm records.	Not Eligible	N/A	
2.) Regulatory Programs	Verified compliance with federal or state agricultural regulatory requirements (non-operational permit).	Non- annual frequency of regulatory compliance inspections for all or sufficient statistical percentage of regulated operations. Review of office/farm records.	Not Eligible	N/A	
3.) Financial Incentive Programs	Verified compliance with federal program contractual requirements.	Non- annual frequency of contractual compliance inspections for all or sufficient statistical percentage of contracted operations during contractual life span. Review of office/farm records.	Not Eligible	N/A	
4.) Financial Incentive Programs	Verified compliance with state or county program contractual requirements.	Non-annual frequency of contractual compliance inspections for all or sufficient statistical percentage of contracted operations during contractual life span. Review of office/farm records.	Potentially Eligible	All RI Practices are eligible if done in accordance with state or county funding requirements and meet RI Visual Indicators.	Visual Indicator Checklist; photo/description; Location documentation

5.) Financial Incentive Programs	Verified compliance with NGO program contractual requirements.	Non-annual frequency of contractual compliance inspections for all or sufficient statistical percentage of contracted operations during contractual life span. Review of office/farm records.	Potentially Eligible	All RI Practices are eligible if done in accordance with NGO funding requirements and meet RI Visual Indicators.	Visual Indicator Checklist; photo/description; Location documentation provided to certifying entity.
6.) Farm Inventory	Farm inventory by trained and certified federal, state, and/or county agency personnel.	Non-annual frequency of inventories for all or sufficient statistical percentage of operations during BMP life span. Review of office/farm records.	Eligible	All RI Practices are eligible if they meet RI Visual Indicators.	Visual Indicator Checklist; photo/description; Location documentation
7.) Farm Inventory	Farm inventory by trained and certified NGO personnel.	Non-annual frequency of inventories for all or sufficient statistical percentage of operations during BMP life span. Review of office/farm records.	Eligible	All RI Practices are eligible if they meet RI Visual Indicators.	Visual Indicator Checklist; photo/description; Location documentation provided to certifying entity.
8.) Farm Inventory	Farmer completes self-certified inventory survey and trained and certified federal, state and/or county personnel verify on-site.	Non-annual frequency of inventories for all or sufficient statistical percentage of operations during BMP life span. Review of office/farm records.	Eligible	All RI Practices are eligible if they meet RI Visual Indicators.	Visual Indicator Checklist; photo/description; Location documentation provided to certifying entity.
9.) Farm Inventory	Farmer completes self-certified inventory survey and trained and certified NGO personnel verify on-site.	Non-annual frequency of inventories for all or sufficient statistical percentage of operations during BMP life span. Review of office/farm records.	Eligible	All RI Practices are eligible if they meet RI Visual Indicators.	Visual Indicator Checklist; photo/description; Location documentation provided to certifying entity

10.) Farm Inventory	Farmer completes in-office self-certified inventory with assistance of trained and certified federal, state and/or county agency personnel. No on-site verification.	Non-annual frequency of inventories for all or sufficient statistical percentage of operations during BMP life span. Review of office/farm records.	Not Eligible	N/A	
11.) Farm Inventory	Farmer completes in-office self-certified inventory with assistance of trained and certified NGO personnel. No on-site verification.	Non-annual frequency of inventories for all or sufficient statistical percentage of operations during BMP life span. Review of office/farm records.	Not Eligible	N/A	
12.) Farm Inventory	Farmer with training and certification completes self-certified inventory survey.	Non-annual frequency of inventories for all or sufficient statistical percentage of operations during BMP life span.	Not Eligible	N/A	
13.) Farm Inventory	Farmer without training and certification completes self-certified inventory survey.	Non-annual frequency of inventories for all or sufficient statistical percentage of operations during BMP life span.	Not Eligible	N/A	
14.) Office Records	Review of existing office records by trained and certified federal, state and/or county agency personnel. No on-site verification.	Non-annual frequency of office records review and verification for all or sufficient statistical percentage of operations during BMP life span.	Not Eligible	N/A	
15.) Farm Records	Review of existing on-farm records by trained and certified federal, state and/or county agency personnel. No on-site verification.	Non-annual frequency of on-farm records review and verification for all or sufficient statistical percentage of operations during BMP life span.	Not Eligible	N/A	

16.) Farm Records	Review of existing on-farm records by trained and certified NGO personnel. No on-site verification.	Non-annual frequency of on-farm records review and verification for all or sufficient statistical percentage of operations during BMP life span.	Not Eligible	N/A	
17.) Transect Survey	Statistically designed and recognized transect survey completed by trained and certified federal, state and/or county personnel.	Non-annual frequency of statistical transect surveys for a sufficient statistical percentage of operations during BMP life span.	Not Eligible	N/A	
18.) Transect Survey	Statistically designed and recognized transect survey completed by trained and certified NGO personnel.	Non-annual frequency of statistical transect surveys for a sufficient statistical percentage of operations during BMP life span.	Not Eligible	N/A	
19.) CEAP Survey	CEAP statistical survey conducted in-person at field-level scale following NASS verification protocols.	Non-annual frequency of statistical CEAP surveys for a sufficient statistical percentage of operations during BMP life span may limit verification.	Potentially Eligible	All RI Practices are eligible if they meet RI Visual Indicators.	NRCS/NASS provide Visual Indicator Checklist; photo/description; Location documentation certifying entity.
20.) NASS Survey	NASS statistical survey conducted at farm-level scale following NASS verification protocols.	Non-annual frequency of statistical NASS surveys for all or sufficient statistical percentage of operations during BMP life span.	Potentially Eligible	All RI Practices are eligible if they meet RI Visual Indicators.	NASS provides Visual Indicator Checklist; photo/description; Location documentation to certifying entity.
21.) NRI Point (NRCS) or some other statistically selected sites	Statistical survey conducted in-person at field-level with NASS trained and certified personnel.	Non-annual frequency of statistical NRI surveys for a sufficient statistical percentage of operations during BMP life span may limit verification.	Potentially Eligible	All RI Practices are eligible if they meet RI Visual Indicators.	NRCS provides Visual Indicator Checklist; photo/description; Location documentation to certifying entity.

22.) Remote Sensing	Statistically designed and recognized remote sensing surveys with supporting field-level scale ground-truthing verification.	Non-annual frequency of statistical remote sensing surveys implemented by trained and certified agency personnel, for all or sufficient statistical percentage of operations during BMP life span.	Potentially Eligible	All RI Practices are eligible if RI Visual Indicators and can be identified by approved methodology and remote sensing signatures.	Inventory Entity provides Visual Indicator Checklist; photo/description; Location documentation to certifying entity
23.) Remote Sensing	Statistically designed and recognized remote sensing surveys with supporting field-level scale ground-truthing verification.	Non-annual frequency of statistical remote sensing surveys implemented by trained and certified NGO personnel, for all or sufficient statistical percentage of operations during BMP life span.	Potentially Eligible	All RI Practices are eligible if RI Visual Indicators and can be identified by approved methodology and remote sensing signatures.	Inventory Entity provides Visual Indicator Checklist; photo/description; Location documentation to certifying entity

APPENDIX C:

ANIMAL UNIT EQUIVALENCIES

One animal unit is generally defined as 1,000 pounds of live animal weight. The numbers given below represent averages for different types of livestock. It may serve as a guideline for the number of animals of a certain type that would constitutes eight animal units for purposes of nutrient management regulations. If actual weights are available from a certified scale, use them. For animals not listed here, contact MDA for guidance on weight calculations.

Animal type	Animal weight (average in pounds)	Number of animals that would equal 8 animal units (AU)
Horses (any animal 3 months or older)	1,000	8
Feed Cattle	1,000	8
Dairy Cattle	1,000	8
Sheep	200	40
Goat	89	90
Alpaca	107	75
Llama	320	25
Emu	133	60
Ostrich	267	30
Broilers/fryers	4	2,000
Ducks	7	1,200
Geese	12	650
Turkeys	19	425

Source: Maryland Dept. of Agriculture 2000

Appendix I. Chesapeake Bay Program BMP Verification Communication and Outreach Strategy

Note: The Communications Workgroup is currently updating its strategy document. They plan to have a final version ready for distribution to the Management Board by September 4th, 2014.

Appendix J. Acknowledgements

This document, and the principles, guidance and supporting evaluation and oversight procedures contained within it, was developed through the collaborative efforts of the Chesapeake Bay Program Partners. Principally, this document was developed through the efforts of the Chesapeake Bay Program (CBP) Water Quality Goal Implementation Team's BMP Verification Committee, and the Team's Agriculture, Forestry, Urban Stormwater, and Wastewater Treatment workgroups, the Habitat Goal Implementation Team's Wetland and Stream Health workgroups, and the CBP Partnership's independent BMP Verification Review Panel. The CBP's Principals' Staff Committee made final decisions on behalf of the Bay Program Partners and CBP's Management Board and the Water Quality Goal Implementation Team provided direction to the BMP Verification Committee. Advice, reviews, and independent perspectives were provided throughout the framework development process by the CBP's Citizen's Advisory Committee, Scientific and Technical Advisory Committee, and Local Government Advisory Committee.

The document resulted from the collaborative expertise, input, feedback, comments, and recommendations from literally hundreds of individuals from the multitude of CBP partnering agencies and institutions, local governments, nongovernmental organizations, businesses, and other stakeholders. Their individual and collective contributions are hereby acknowledged.

Special acknowledgment is made to members of the following CBP committees, teams, workgroups, and panels: BMP Verification Committee, Agriculture Workgroup, the Agriculture Workgroup's Functional Equivalents Expert Review Panel, the Agriculture Workgroup's Management Plan Verification Expert Panel, Forestry Workgroup, Urban Stormwater Workgroup, Wastewater Treatment Workgroup, Wetland Workgroup, Stream Health Workgroup, Water Quality Goal Implementation Team, Habitat Goal Implementation Team, BMP Verification Review Panel, Scientific and Technical Advisory Committee, the Scientific and Technical Advisory Committee's BMP Verification Subgroup, Local Government Advisory Committee, Citizens Advisory Committee, the Citizens' Advisory Committee's Workgroup on Verification and Transparency, Management Board, and the Principals' Staff Committee. Appendix K provides detailed members listings of each of these panels, committees, teams and workgroups who were instrumental in developing this Chesapeake Bay basinwide BMP verification framework.

The work of the members of the Bay Program's BMP Verification Committee in leading and coordinating the work going into development, review, and approval of the basinwide verification framework is hereby acknowledged. Those members include the following individuals (in alphabetical order): Bill Angstadt, Delaware Maryland Agribusiness Association; Rich Batiuk, U.S. Environmental Protection Agency; Russ Baxter, Virginia Department of Environmental Quality; Evan Branosky, World Resources Institute; Pat Buckley, Pennsylvania Department of Environmental Protection; Valerie Frances, U.S. Department of Agriculture; Melanie Frisch, U.S. Department of Defense; Jack Frye, Chesapeake Bay Commission; Roy Hoagland, HOPE Impacts; Susan Marquart, U.S. Department of Agriculture; Beth McGee, Chesapeake Bay Foundation; Matt Monroe, West Virginia Department of Agriculture; Tom Morgart, U.S. Department of Agriculture; George Onyullo, District of Columbia Department of Environment; Marel Raub, Chesapeake Bay Commission John Rhoderick, Maryland Department of Agriculture; Aaron Ristow, Upper Susquehanna Coalition; Ann Swanson, Chesapeake Bay

Commission; Jennifer Volk, University of Delaware; Andy Zemba, Pennsylvania Department of Environmental Protection; and Hank Zygmunt, Resource Dynamics, Inc.

The following members of the Partnership's BMP Verification Review Panel, an external independent group of expertise selected because of their varied verification experiences, provided invaluable advice, feedback, and recommendations during the development of the framework (in alphabetical order): Dr. Curtis Dell, U.S. Department of Agriculture Agricultural Research Service, University Park, Pennsylvania; Mike Gerel, Sustainable Northwest, Portland, Oregon; Dr. Tim Gieseke, Ag Resource Strategies, New Ulm, Minnesota; Rebecca Hanmer, U.S. Environmental Protection Agency (retired), Fredericksburg, Virginia; Dr. Dianna Hogan, U.S. Geological Survey Eastern Geographic Science Center, Reston, Virginia; Richard Klein, Community and Environmental Defense Services, Owings Mills, Maryland; Dr. Andrew Sharpley, University of Arkansas, Fayetteville, Arkansas; Dr. Tom Simpson, Watershed Stewardship, Annapolis, Maryland; Dr. Gordon Smith, Wildlife Works Carbon LLC, Mill Valley, California; Rebecca Stack, District of Columbia Department of Environment, Washington, DC; Dr. Robert Traver, Villanova University's Department of Civil and Environmental Engineering, Philadelphia, Pennsylvania; Dana York, Green Earth Connection, Centreville, Maryland; and Dan Zimmerman, Warwick Township, Lancaster County, Pennsylvania.

A very special acknowledgement is also made to the following individuals (in alphabetical order) for their leadership within the Partnership and their tireless contributions to the development of the components of the basinwide verification framework: Sally Claggett, Coordinator, CBP Forestry Workgroup, U.S. Forest Service; Denise Clearwater, Chair, Wetland Workgroup, Maryland Department of the Environment; Dr, Frank Coale, former Chair, CBP Agriculture Workgroup, University of Maryland; Mark Dubin, Coordinator, CBP Agriculture Workgroup, University of Maryland; Norm Goulet, Chair, CBP Urban Stormwater Workgroup, Northern Virginia Regional Planning Commission; Jennifer Greiner, Coordinator, CBP Wetland Workgroup, U.S. Fish and Wildlife Service; Rebecca Hanmer, Chair, CBP Forestry Workgroup, retired-U.S. Environmental Protection Agency; Debbie Hopkins, Coordinator, Stream Health Workgroup, U.S. Fish and Wildlife Service; Ron Klauda, Co-chair, CBP Stream Health Workgroup, Maryland Department of Natural Resources; Bernie Marczyk, Co-Chair, CBP Wetland Workgroup, Ducks Unlimited; John Rhoderick, Co-Chair, CBP Agriculture Workgroup; Kristen Saacke-Blunk, Co-Chair, CBP Agriculture Workgroup; Tom Schueler, Coordinator, CBP Urban Stormwater Workgroup, Chesapeake Stormwater Network; Mark Secrist, Co-Chair, CBP Stream Health Workgroup, U.S. Fish and Wildlife Service; Tanya Spano, Chair, CBP Wastewater Treatment Workgroup, Metropolitan Washington Council of Governments; and Ning Zhou, Coordinator, CBP Wastewater Treatment Workgroup, Virginia Tech. The work of the CBP Partnership's technical source sector and habitat restoration workgroups laid the solid technical and programmatic foundation on which the Partnership built the overarching framework.

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Appendix L. Building the Basinwide Framework

The Bay Program Partners developed its basinwide BMP verification framework building directly from a number of existing and ongoing programs and efforts which addressed specific components of the overall framework. Those programs and efforts are briefly described below.

Jurisdictions' Existing BMP Tracking, Verification and Reporting Programs

All seven watershed jurisdictions—Delaware, District of Columbia, Maryland, New York, Pennsylvania, Virginia, and West Virginia—have existing programs in place for tracking, verifying, and reporting on implementation of BMPs and other treatments and technologies leading to reductions in nutrient and sediment pollutant loads. As a condition for receiving Chesapeake Bay Implementation Grant and Chesapeake Bay Regulatory and Accountability Grant funding from EPA, each of the seven jurisdictions have developed quality assurance project plans describing their collection, management, and reporting of environmental data.[1] The seven jurisdictions' existing quality assurance project plans are principally focused on documentation of their extensive BMP tracking and reporting programs and procedures for submitting the collected data to EPA through their state's national environmental information exchange network (NEIEN) node. The Bay Program Partners's work on BMP verification builds directly on these existing jurisdictions' BMP tracking, verification, and reporting programs. The jurisdictions' current Quality Assurance Project Plans provide detailed descriptions of verification procedures currently in place. Revised versions of these documents will serve as the basis for documenting further improvements in the jurisdictions'verification programs and protocols.

USDA Agricultural Conservation Practice Verification[2]

USDA cost-share programs provide incentives for a number of conservation practices. Individual agencies— Natural Resources Conservation Service (NRCS) and Farm Service Agency (FSA)—have procedures in place to evaluate landowner eligibility, validate practices, and monitor implementation. A multi-agency effort—the Conservation Effects Assessment Project, or CEAP—evaluates the environmental outcomes of USDA-supported conservation practices.

NRCS Conservation Practices. NRCS provides technical and financial assistance to landowners to implement specific conservation practices through programs like the Environmental Quality Incentives Program (EQIP). After a practice is implemented, agency personnel check compliance with plans and specifications and certify the practice(s) as qualified for cost share. While third party technical service providers (TSPs) may perform this function, they typically do not. In the Chesapeake Bay watershed, some non-governmental (NGO) organizations such as the Chesapeake Bay Foundation have become TSPs for supporting implementation of specific practices such as riparian buffers under the Conservation Reserve Enhancement Program (CREP). Data used to support practice certification includes location identification, practice

[1] The seven Chesapeake Bay watershed jurisdictions' current (as of May 2014) quality assurance plans are available under the "Projects & Resources" tab at http://www.chesapeakebay.net/groups/group/best_management_practices_bmp_verification_committee.

[2] Text summarized from the June 2011 USDA Office of Environmental Markets' *Verification of Environmental Credits: Chesapeake Bay Environmental Markets Team Discussion Paper*.

design and specifications, and field notes from on-site inspections. Practice specifications are laid out at the county level in the various NRCS Field Office Technical Guides.

In addition to certifying cost-shared practices, NRCS policies require the agency to perform spot checks on offices that certify conservation practices, the practices themselves, and practices performed by technical service providers. Offices are to be checked once every third year. Each fiscal year, the agency performs spot checks on 5 percent of practices, up to a total of 20 practices per state. Spot checks are distributed among different types of practices and technical work of agency employees. They focus on practices that are more costly, represent a high proportion of total cost-share funds, or have higher risk of failure. There is a requirement to spot check all cost-shared practices on farms owned by NRCS employees, or in which agency employees have an interest. Further requirements are in place to ensure employees are not checking their own work. Spot checking of TSPs is more intense during the first three years in which the contractor is a certified TSP (NRCS 2009).

NRCS Conservation Program Contracts. NRCS also evaluates its conservation planning activities. Conservation program contracts may include a number of conservation practices. These contracts are reviewed on an annual basis, either by an NRCS conservationist or a TSP performing conservation planning work. Review elements include adequacy of the plan, whether or not practices are completed or on track to be completed, status of operation and maintenance, status of payments, and agreement on practices to be implemented in the following year. The agency also checks 5 percent of contracts annually to verify farmer self-certifications. These include being certified as a limited-resource farmer, a beginning farmer, or having control of the land for the life of the contract. The agency may also check up on additional landowners if it receives a complaint or suspects the certification to be incorrect (NRCS 2010).

Conservation Reserve Program. FSA administers the Conservation Reserve Program (CRP), which compensates roughly one million landowners or producers for long-term conservation. FSA has a partnership with NRCS to achieve program goals. Once FSA determines who is eligible for payment, NRCS works with those producers to develop conservation plans. Producers then sign contracts with FSA to implement their plan. In the past, USDA staff would certify all practices before making payments. However, spurred by USDA Office of the Inspector General's recommendations to reduce spending on site visits, FSA now allows producers to self-certify that they have implemented practices. Roughly 90 percent of practices are self-certified; the remainder being certified by USDA staff. Of the 90 percent that are self-certified, the agency spot checks 5 percent per year. Thus about 14 percent of practices are verified via site visits each year.

Due to the nature of the CRP practices, FSA or other USDA agency staff can use aerial photos to monitor land cover throughout the life of the contract. The agency's National Agricultural Imagery Program acquires these photos on a three-year cycle. During a recent reenrollment/ extension cycle, FSA inspected all CRP practices up for renewal or extension, spending about $19 million to verify 28 million acres of conservation practices. At that time, only a small percentage of practices were found to be below standard.

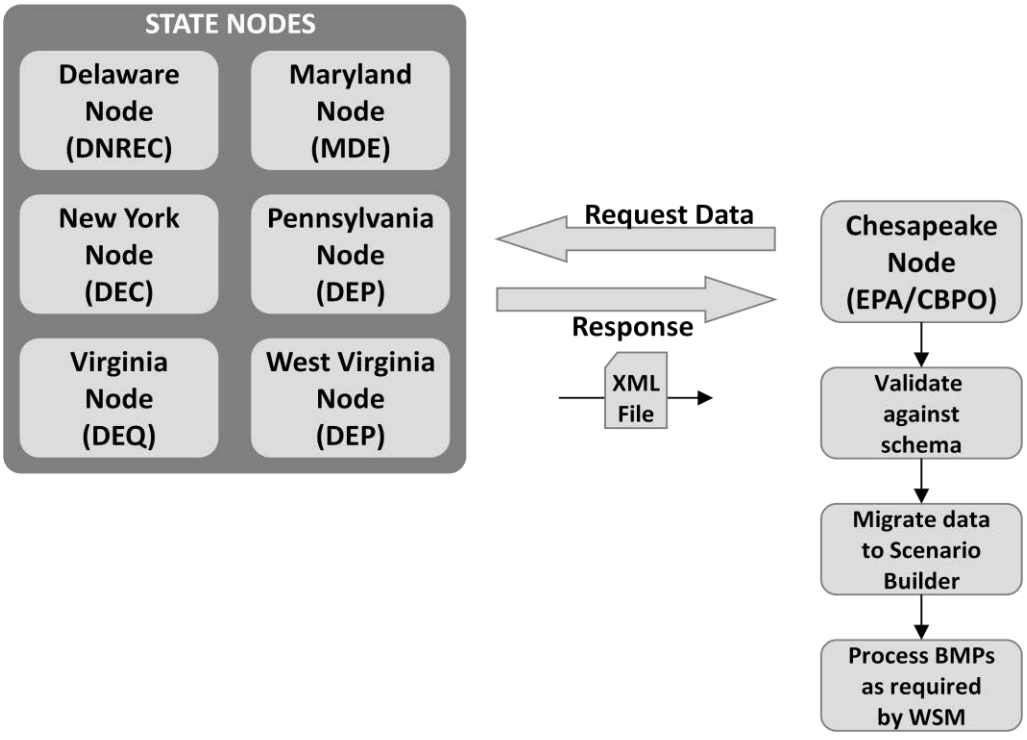
The Conservation Reserve Enhancement Program (CREP) is an offshoot of the Conservation Reserve Program (CRP). Administered by the FSA, CREP targets high-priority conservation issues identified by local, state, or tribal governments or non-governmental organizations. In exchange for removing environmentally sensitive land from production and introducing conservation practices, farmers, ranchers, and agricultural land owners are paid an annual rental rate. Participation is voluntary, and the contract period is typically 10–15 years.

The National Environmental Information Exchange Network

The National Environmental Information Exchange Network (NEIEN) is a state-federal data-sharing partnership by which environmental information can be shared, integrated, analyzed, and reported without having to take possession of the data. Within the Bay Program, NEIEN is an internet- and standards-based method for securely exchanging non-point source BMP information between jurisdictional partners and EPA through a system of "nodes" that communicate and handle requests. The Bay Program is building on the existing NEIEN system to incorporate data field and standards for exchanging information relevant to verification of individual practices, treatments, and technologies.

BMP data from the jurisdictions is submitted to NEIEN in the form of an XML file which allows multiple data elements to be associated with each record. Some of those elements include: implementation date, maintenance date, inspection date, reporting agency, funding source, geographic coordinates, etc. This detailed BMP information is then migrated into Scenario Builder and is processed according to Watershed Model needs, based on rules developed in consultation with the state and documented in the appropriate Quality Assurance Project Plan (QAPP).

Figure L-1. Illustration of National Environmental Information Exchange Network (NEIEN) Process



National Association of Conservation Districts

The *Strategy for Protecting and Restoring the Chesapeake Bay Watershed*,[3] developed by the Federal Leadership Committee under Executive Order 13508,[4] called for increased commitment from federal agencies in the Chesapeake Bay watershed to assist the six watershed states to reach their water quality goals. As described previously, one of the issues highlighted in the Executive Order and its Strategy was for USDA to assist states to get a full accounting of both cost- and non-cost-shared conservation practices. It was in this spirit that USDA contracted with the National Association of Conservation Districts (NACD) to determine if there was a common protocol possible to collect information on voluntary practices, and to assist states to develop state protocols to collect additional non-cost shared practices that have been implemented in the six Chesapeake Bay watershed states.

The NACD concluded that development of a common protocol for collection of non-cost shared conservation practices for use by all six watershed states would be extremely difficult at that time.[5] All six watershed states now see the value in gathering as much information as possible on BMPs that are farmer funded and not in a database anywhere, but the lack of adequate funds was a major stumbling block. The cross-state discussions proved very valuable and encouraged many in decision making and funding positions to consider the payback on the investment to gather voluntary BMP information. The Bay Program Partners's basinwide BMP verification framework has drawn from these lessons learned through the NACD process in building verification protocols which can be used to account for and credit non-cost shared practices installed by agricultural producers.

USGS 1619 Data Sharing Agreements with NRCS and FSA

Concerns have long been expressed by the agricultural community that nutrient and sediment load reductions were not being fully reported by the Chesapeake Bay watershed states nor fully credited in the Annual Progress Review, owing to lack of consistent access to USDA conservation practice implementation data and to reporting inconsistencies among the six watershed states.

In 2010, NRCS entered a partnership with the U.S. Geological Survey (USGS) establishing USGS as a Conservation Cooperator with privacy protected access to USDA farmland datasets. The USGS coordinated with NRCS and the Bay Program and assisted in the compilation of an accurate, comprehensive dataset that has been well integrated with the jurisdictional datasets that are also used to assess, track, and reporting implementation progress in conservation practices. To help provide consistency and completeness of conservation practice reporting among the six Chesapeake Bay watershed states, USDA requested USGS take on the role as a facilitator to use its expertise to acquire and process conservation data from NRCS and FSA. As an impartial scientific third party, USGS was able to play a key role in communication and data transfer between the agencies responsible for implementation of Federal conservation programs—NRCS and FSA, the six watershed states— Delaware, Maryland, New York, Pennsylvania, Virginia,

[3] Federal Leadership Committee for the Chesapeake Bay. 2010. Strategy for Protecting and Restoring the Chesapeake Bay Watershed. Available online at http://executiveorder.chesapeakebay.net/page/Reports-Documents.aspx

[4] http://executiveorder.chesapeakebay.net/

[5] Ensor, R., and D. York. 2011. Final Report. *National Association of Conservation Districts State Protocol Collection of Non-Cost Shared BMPs.* Available online at http://howardscd.org/SCD/scd_nacdprotocolproject.htm

and West Virginia, and the organization responsible for tracking progress towards attaining conservation goals—the Bay Program. Recognizing 1619 data sharing agreements are a fundamental building block on which the state partners will be assured full access to federal cost shared conservation practice data, modification of existing and development of new 1619 data sharing agreement between USDA and the six watershed states are building off of the experiences of USGS's data sharing agreements (see Appendix E).

USGS took on the task of acquiring, assessing, and evaluating agricultural conservation practice data records for USDA programs and transferring those datasets in aggregated format to state agencies for use in reporting conservation progress to the Bay Program. The USGS role was to pilot this work, resolve issues, and set a foundation for future tracking and reporting of USDA practices by the six watershed states[6]. A methodology was developed to request and acquire the USDA conservation practice datasets, clean them to remove internal duplication, aggregate the data to protect farmer privacy, and transfer the data to the six watershed states.

The objectives of the project were the following:

- Provide the six watershed states with a consistent dataset of USDA financially assisted agricultural conservation practices implemented by NRCS and FSA throughout the Chesapeake Bay watershed, along with consistent definitions for agricultural conservation practices.

- Document the various methods used by the six watershed states to obtain agricultural conservation data and address double counting where financial assistance was jointly provided through federal and state programs.

- Provide a "crosswalk" document that translates between USDA conservation practice codes and the Bay Program's approved practice definitions.

- Streamline the overall tracking and reporting process to reduce the workload for the six watershed states.

- Document and improve existing protocols to support ongoing adaptive management of conservation practice data reporting for Chesapeake Bay watershed agricultural lands and operations.

In 2013, USGS published the findings of its work with NRCS, FSA, and the six watershed states in a detailed report entitled *Integrating Federal and State Data Records to Report Progress in Establishing Agricultural Conservation Practices on Chesapeake Bay Farms*[7] (see Appendix P).

[6] The USGS is providing only short-term assistance with obtaining and aggregating USDA conservation practice data, given the USGS-USDA 1619 Conservation Cooperator Agreements are set to expire in 2015.

[7] Hively, W.D., Devereux, O.H., and Claggett, P. 2013. *Integrating Federal and State data records to report progress in establishing agricultural conservation practices on Chesapeake Bay farms*: U.S. Geological Survey Open-File Report 2013–1287, 36 p., http://dx.doi.org/10.3133/ofr20131287. http://pubs.usgs.gov/of/2013/1287/

Virginia Non-cost Share Practice Tracking and Report Pilot Study

At the direction of their state General Assembly, the Virginia Department of Conservation and Recreation undertook a pilot study for further developing a strategy for collecting and reporting non-cost shared agricultural and forestry conservation practices. Grant agreements were initiated with six soil and water conservation districts—Blue Ridge, Holtson River, Shenandoah Valley, Thomas Jefferson, Three Rivers, and Virginia Dare—to pilot procedures for on-farm assessment, data collection, entry and reporting of non-cost shared practices. These Districts were selected to represent the diversity of agricultural operations that exists throughout Virginia. Each District was directed to develop and document their outreach and assessment procedures, develop necessary assessment tools, and conduct a minimum of 10 on-farm assessments per month.

The results of these assessments were evaluated to determine if the practices met established standards and specifications for design and construction. In total, 725 farm visits were conducted resulting in 519 practices collected during the pilot study. Assuming the farm visits conducted and the BMPs collected during the pilot study were representative of the state as a whole, extrapolation would suggest that an additional 5-10 percent additional non-cost shared BMPs could be reported beyond the federal and state cost share program practices already tracked and reported by Virginia[8].

USDA Office of Environmental Markets

The USDA Office of Environmental Market's Chesapeake Bay Environmental Markets Team (CB EMT) was chartered by the *Strategy for Protecting and Restoring the Chesapeake Bay Watershed*, issued on May 12, 2010 as directed by Executive Order 13508. The CB EMT facilitated collaboration among federal agencies in development of the infrastructure needed for enabling environmental markets to function effectively in the Chesapeake Bay watershed. The CB EMT's working papers[9,10] presented the perspectives of technical experts on a broad variety of issues related to the development and operation of environmental markets. USDA helped lead the way on thinking through the different approaches to undertaking verification through these key Office of Environmental Markets publications (see Appendices R and S).

Response to NAS Chesapeake Bay Evaluation Panel Report

On May 4, 2011, the National Research Council (NRC) of the National Academy of Sciences publically released the report entitled *Achieving Nutrient and Sediment Reduction Goals in the Chesapeake Bay: An Evaluation of Program Strategies and Implementation*.[11] This work was conducted under the direction of the Chesapeake Executive Council. The Principals' Staff Committee, at its May 10, 2011 meeting, directed the Bay Program to provide a formal written response to all 25 of the NRC panel's science based conclusions within 90 days (by August 4,

[8] Stephanie Martin. Personal Communication. Draft Report on Virginia Department of Conservation and Recreation Non-Cost Shared Practices Tracking and Reporting Pilot Study. October 31, 2012. Virginia Department of Conservation and Recreation, Richmond, Virginia.
[9] Chesapeake Bay Environmental Markets Team. 2011. A Registry for Environmental Credits: Chesapeake Bay Environmental Markets Team White Paper. Prepared by Kate Bennett and Al Todd. Provided as Appendix F.
[10] Chesapeake Bay Environmental Markets Team. 2011. Verification of Environmental Credits: Chesapeake Bay Environmental Markets Team Discussion Paper. Prepared by Katie Cerretani and Al Todd. Provided as Appendix G.
[11] National Research Council. 2011. *Achieving Nutrient and Sediment Reduction Goals in the Chesapeake Bay: An Evaluation of Program Strategies and Implementation.* Washington, DC: The National Academies Press. Available on-line at: http://www.nap.edu/catalog.php?record_id=13131

2011); the deadline was later extended to 180 days (November 4, 2011) by the CBP's Management Board. The Principals' Staff Committee reconvened the Independent Evaluator Action Team to produce a written response to provide a public record on how the Bay Program was implementing the NRC panel's science based conclusions.

The Chesapeake Bay Program Partners's formal response was comprised of two documents—*Key Challenges*[12] and *CBP Suggested Responses to May 2011 NRC Report*[13]–were formally transmitted to the Principals' Staff Committee on November 3, 2011[14]. Both documents specifically addressed the NRC Panel's science based conclusions in regards to Best Management Practice effectiveness with a focus on monitoring, tracking and accountability. The Panel's conclusions were a major driver for the Partnership's development and adoption of the Chesapeake Bay Basinwide BMP Verification Framework.

[12] *Key Challenges Identified by the Chesapeake Bay Program Partners from the NAS/NRC Report Entitled 'Achieving Nutrient and Sediment Reduction Goals in the Chesapeake Bay: An Evaluation of Program Strategies and Implementation.'* 2011. November 2011 version. Available on the February 16th, 2012 PSC meeting page, or: http://www.chesapeakebay.net/channel_files/17880/%28attachment_iii.d%29_key_challenges_v11-1-2011_v11-17-2011.pdf

[13] *CBP Suggested Responses to May 2011 NRC Report*. 2011. November 2011 version. Available on-line on the February 16th, 2012 PSC meeting page, or: http://www.chesapeakebay.net/channel_files/17880/%28attachment_iii.c%29_cbp_partner_suggested_responses_to_may_2011_nrc_report_v11-17-2011.pdf

[14] Memorandum from Nicholas DiPasquale, Chair CBP Management Board, to Shawn Garvin, Chair, CBP Principals' Staff Committee, November 3, 2011. Available on-line on February 16th, 2012 PSC meeting page, or: http://www.chesapeakebay.net/channel_files/17880/%28attachment_iii.b%29_memo_mb_to_psc_ie_recommendations_final_11-3-2011.pdf .

Appendix M. Bay Program Process for Development of the Basinwide BMP Verification Framework

At the February 16, 2012 Principals' Staff Committee meeting[1], the Bay Program reached agreement to proceed forward with development of a basinwide BMP verification framework. The Principals' Staff Committee agreed to proceed with the proposed work plan, the initial schedule, and a process for developing a comprehensive BMP tracking, verification and reporting system on behalf of the Bay Program. The Water Quality Goal Implementation Team's BMP Verification Committee[2] was established and charged with communicating the Bay Program work on this initiative widely with stakeholders and tracking the framework development and review progress. The Principals' Staff Committee agreed it would resolve and approve issues related to reviewing, modifying, and adopting the BMP verification framework and schedule on behalf of the partnership—as recommended by the Management Board—and to communicate the adoption of the basinwide BMP verification framework widely with stakeholders.

Roles and Responsibilities within the Bay Program

The overall decision making process on the elements of the basinwide BMP verification framework was based on work flowing up from the source sector and habitat restoration workgroups to the BMP Verification Committee (Table M-1). The BMP Verification Committee then worked closely with the BMP Verification Review Panel, seeking their review of the BMP verification principles, guidance, and the other framework elements.

Factoring in feedback from the Panel, the BMP Verification Committee then worked up through the Water Quality Goal Implementation Team, Habitat Goal Implementation Team, and Fisheries Goal Implementation Team as well as briefings and seeking feedback from the Bay Program's three advisory committees—Scientific and Technical Advisory Committee, Citizen Advisory Committee, and Local Government Advisory Committee, prior to going to the Management Board. Based on discussions and decisions by the Management Board, recommendations were then presented to the Principals' Staff Committee for final review, decisions, and adoption. As the Bay Program entered the final stages of review, approval, and adoption of the basinwide framework, the BMP Verification Panel presented its feedback and recommendations directly to the Management Board and Principals' Staff Committee.

Table M-1. BMP verification framework development and decision making roles within the Chesapeake Bay Program management structure.

Bay Program Group	Description of Role
Technical Workgroups	Development of the source sector/habitat specific verification guidance
BMP Verification Committee	Oversight of development of the elements of the BMP verification framework; initial decision making on what is

[1] http://www.chesapeakebay.net/S=0/calendar/event/17880/
[2] http://www.chesapeakebay.net/groups/group/best_management_practices_bmp_verification_committee

	included in the framework components, factoring in reviews and feedback received from the BMP Verification Review Panel, the Goal Implementation Teams, and the Bay Program's three advisory committees
BMP Verification Review Panel	Reviewing and providing feedback on the principles, guidance, and other elements of the basinwide BMP verification framework; responsible for the review of the jurisdictions' proposed BMP verification programs and providing recommendations back to the Principals' Staff Committee
Goal Implementation Teams	Reviewing recommendations coming from the BMP Verification Committee; providing feedback to the BMP Verification Committee; agreeing on what gets forwarded to the Management Board for further review and decisions
Management Board	Reviewing recommendations from the Goal Implementation Teams; receives the direct feedback and recommendations from the BMP Verification Review Panel; decides what will be forwarded to the Principals' Staff Committee for review and final decisions
Principals' Staff Committee	Final decision-making on the basinwide BMP verification framework on behalf of the larger Bay Program based on recommendations from the Management Board and the BMP Verification Review Panel

Framework Development and Decision Making Sequence over Time

The development of the framework worked from the technical level up to the policy level, with built-in feedback loops. All the workgroup, goal implementation team, board, committee, and panel conference calls and meetings where BMP verification was a topic on the agenda were open to the public. All these conference calls and meetings were also announced in advance via the web, with full public access to all conference call/meeting agendas, advance briefing materials, presentations, and conference call/meeting summaries through the Bay Program's web site calendar accessible at http://www.chesapeakebay.net/calendar. A complete listings of all the Bay Program's workgroup, goal implementation team, board, committee, and panel conference calls and meetings at which discussion of any BMP verification related items were on the agenda is provided in Appendix N, with links to each respective web-based conference call/meeting calendar event listing.

The framework development schedule evolved through time as the Bay Program's workgroups, teams, committees, and panel got a better understanding of just how long it was going to take to develop, review and reach agreement among the Bay Program Partners on the different components of the basinwide framework. The BMP Verification Committee formally requested the Management Board's approval of changes to the Bay Program's basinwide BMP verification

framework development schedule. The approved, updated schedule was then posted on the BMP Verification Committee's web page for public access.

The Water Quality Goal Implementation Team and Habitat Goal Implementation Team's six **technical workgroups**—Agriculture, Forestry, Urban Stormwater, Wastewater Treatment, Wetlands, and Streams—developed their sector specific BMP verification guidance over the course of their normal schedules of workgroup conference calls and face-to-face meetings. Each set of verification guidance underwent numerous reviews as drafts were distributed among workgroup members and interested parties, discussed by the workgroup during publically scheduled conference calls and face to face meetings, and direction from the collective workgroup membership was given on further changes to be made.

At several BMP Verification Committee meetings over the course of 2012 and 2013 (e.g., June 19, 2012, September 12, 2012, and February 21, 2013), all six sets of workgroup chairs and workgroup coordinators were invited to present their respective workgroup's most recent version of their draft verification guidance and answer questions from the full Committee membership. As a follow up to each of these Committee meetings, the workgroups received written feedback and requests for further enhancements to their draft guidance from the BMP Verification Committee chair.

In parallel, the BMP Verification Review Panel invited the workgroup chairs to present their verification guidance at Panel meetings (e.g., December 6, 2012, August 28-29, 2013, and April 1, 2014). The Panel's distributed its overall recommendations to all the workgroups on development of their guidance along with specific comments directed to each individual workgroup on November 19, 2013[3] (See Appendix D).

The **BMP Verification Committee** scheduled conference calls and face-to-face meetings timed to coincide with the availability of the next round of draft verification guidance documents and other draft components of the larger BMP verification framework. Each meeting and conference call was structured so that the members had access to advance briefing materials and the requested decisions and actions were outlined in the agendas themselves so members could come prepared to make decisions and provide the requested feedback/direction.

Early on in the development process, the Committee established a series of web pages on the Bay Program's web site for publically sharing the draft and interim products of its collective work[4]. The Committee continued to use its series of web pages as a forum for ensuring the Bay Program and other interested parties had access to the most recent draft versions of components of the basinwide framework, so they could follow the progress of the Committee's work over time.

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[3] *Chesapeake Bay Program BMP Verification Review Panel's Guidance and Recommendations to the Six Source Sector Workgroups, the CBP BMP Verification Committee, and the Seven Watershed Jurisdictions.* Distributed November 19, 2013.
http://www.chesapeakebay.net/channel_files/21511/cbp_bmp_verif_review_panel_recommendations_11_19_2013.pdf

[4] All the various draft versions of the workgroups' BMP verification guidance were made publically accessible at http://www.chesapeakebay.net/groups/group/best_management_practices_bmp_verification_committee under the Projects and Resources tab.

The Committee formed an Ad-hoc Transparency Subgroup to work directly with the Citizens Advisory Committee (see below) on exactly how transparency would be built into the basinwide BMP verification framework. See Appendix K for a listing of the Subgroup members and see Appendix A for documentation of the efforts of the Subgroup.

The **BMP Verification Review Panel** established its meeting and conference call schedule based on the timing when the BMP principles, guidance, and other components of the basinwide framework were already well formed drafts, but not yet close to final. The Panel's feedback and recommendations from each conference call/meeting were provided to the BMP Verification Committee for follow up action or assignment to one of the six technical workgroups. And as with the workgroups, goal implementation teams, and committees, all the Panel's meetings and conference calls were open to the public with all the agendas, advance briefing materials, and presentations posted on the Bay Program's web site in advance (see Appendix N for the list of the specific meeting dates).

The **Water Quality Goal Implementation Team** received regular verbal and written updates on the progress of development of the basinwide BMP verification framework during its regularly scheduled monthly conference calls (see Appendix N for the list of the specific conference call dates). The BMP Verification Committee would periodically bring specific draft framework components to the attention of the Team for review and feedback. Once the BMP Verification Committee had developed the entire draft BMP verification framework, the Water Quality Goal Implementation Team was asked for their review and approval to bring the framework forward to the Management Board.

The Bay Program's three **advisory committees**—Scientific and Technical, Citizens, and Local Government—were periodically briefed on the progress being made in development of the basinwide verification framework (see Appendix N for the list of the specific meeting dates). Each advisory committee was focused on particular issues or components of the overall BMP verification framework as described here. The Bay Program asked each respective advisory committee to help work through the resolution of the issues they raised.

The Scientific and Technical Advisory Committee (STAC) focused its attention on the process of verification and ensuring there were clear oversight, performance evaluation, and programmatic review functions built into the basinwide BMP verification framework (see Appendix N for list of specific meeting dates). The STAC formed a BMP Verification Subgroup (see Appendix A for the membership list) charged with responsibility for reviewing the proposed approach to ensuring evaluation and oversight of the jurisdictions' verification programs. The Subgroup provided its draft review findings and recommendations to the BMP Verification Committee in August 2013[5] (see Appendix U).

The Local Governments Advisory Committee (LGAC) placed its emphasis on ensuring the proposed verification procedures could be effectively carried out by local governments

[5] CBP Scientific and Technical Advisory Committee. August 16, 2013. Draft Review by STAC BMP Verification Subgroup. Annapolis, MD.
http://www.chesapeakebay.net/channel_files/20832/draft_stac_verification_oversight_subgroup_16aug2013.pdf

throughout the Chesapeake Bay watershed (see Appendix N for list of specific meeting dates). LGAC was aided by the presence of a Pennsylvania Township Manager on the BMP Verification Review Panel (see Appendix C), ensuring a local perspective was factored into the discussions and recommendation of the Panel.

The Citizens Advisory Committee (CAC) provided the most specific documentation on their concerns and recommendations for addressing those concerns in their correspondence with the Bay Program (see Appendix J).[6, 7, 8, 9, 10] The CAC pursued clarity in how the Bay Program was going to ensure full accountability and transparency throughout the basinwide BMP verification framework and the resultant jurisdictional BMP verification programs, and championed priority attention to those practices on which jurisdictions were relying upon the most in their WIPs (See Appendix N for list of specific meeting dates). CAC formed a Workgroup on Verification and Transparency (see Appendix A for a list of members) in response to a request from the Bay Program to help describe exactly how transparency could be built into the BMP verification framework.

The **Management Board** received regular verbal and written updates from the BMP Verification Committee on the progress of development of the basinwide BMP verification framework during its regularly scheduled conference calls and face-to-face meetings (see Appendix N for the list of the specific meeting and conference call dates). The BMP Verification Committee would periodically bring specific draft framework components or requests for modification to the overall work plan/schedule to the attention of the Board for review, feedback, and decisions. Once the Water Quality Goal Implementation Team reviewed the entire draft basinwide BMP verification framework, the Management Board was asked for their review and approval to bring the draft framework forward to the Principals' Staff Committee for final review and approval.

The **Principals' Staff Committee** was periodically briefed on the progress of development of the basinwide BMP verification framework (see Appendix N for the list of the specific meeting dates). At these meetings, the Principals' Staff Committee was asked to affirm that the Bay Program was heading the right direction on the development of the verification framework or

[6] Citizens' Advisory Committee. January 3, 2012. Letter to the Principals' Staff Committee. Provided as Appendix D. Available at http://www.chesapeakebay.net/channel_files/20829/cac_letter_to_psc_on_nas_recs_jan_2012.pdf
[7] Citizens' Advisory Committee. December 17, 2012. Letter to Nick DiPasquale. Provided as Appendix E. Available on-line at: http://www.chesapeakebay.net/channel_files/19255/final_cac_letter_to_cbpo_on_ag_bmp_verification_dec_17_2012.pdf
[8] DiPasquale, N. February 4, 2013. Letter to John Dawes, Chair, Citizens' Advisory Committee. Provided as Appendix L. Available on-line at: http://www.chesapeakebay.net/channel_files/19255/cbpo_response_to_cac_on_bmp_verification_020413.pdf
[9] Harrison, V., Hanmer, R., Der, A., and J. Blackburn. May 22, 2013. Recommendations of the CAC workgroup on verification and transparency. Provided as Appendix M. Available on-line at: http://www.chesapeakebay.net/channel_files/20829/memo_to_cac_from_verification_and_transparency_workgroup_may_22_2013.pdf
[10] Citizens Advisory Committee to the Chesapeake Executive Council's July 25, 2013 Letter to Nick DiPasquale, Director, Chesapeake Bay Program. Available on-line at: http://www.chesapeakebay.net/channel_files/20829/cac_bmp_verification_letter_final_july_25_2013.pdf

provide other direction. Once the Management Board reviewed the entire draft BMP verification framework, the Principals' Staff Committee was asked for their final review and approval.

APPENDIX N. Record of Chesapeake Bay Program Meetings and Teleconferences including BMP Verification

Below are lists of meetings and teleconferences that occurred, or were scheduled, as of August 2014 and included BMP verification on the agenda. The most recent events are listed first. Links are provided to the CBP calendar entry or other site with an agenda, minutes, and meeting materials.

BMP Verification Steering Committee

- July 31, 2014: www.chesapeakebay.net/calendar/event/21910/
- April 2, 2014: http://www.chesapeakebay.net/calendar/event/21522
- January 28, 2014: http://www.chesapeakebay.net/calendar/event/21132/
- March 13, 2013: www.chesapeakebay.net/calendar/event/19218/
- February 21, 2013: www.chesapeakebay.net/calendar/event/18958/
- January 22, 2013: www.chesapeakebay.net/calendar/event/18957/
- November 26, 2012: www.chesapeakebay.net/calendar/event/18951/
- October 31, 2012: www.chesapeakebay.net/calendar/event/18700/
- September 12, 2012: www.chesapeakebay.net/calendar/event/18557/
- August 16, 2012: www.chesapeakebay.net/calendar/event/18556/
- July 19, 2012: www.chesapeakebay.net/calendar/event/18512/
- June 19, 2012: www.chesapeakebay.net/calendar/event/18404/
- May 18, 2012: www.chesapeakebay.net/calendar/event/18318/
- April 30, 2012: www.chesapeakebay.net/calendar/event/18241/
- March 27, 2012: www.chesapeakebay.net/calendar/event/18703/

BMP Verification Review Panel

- April 2, 2014: http://www.chesapeakebay.net/calendar/event/21522
- April 1, 2014: http://www.chesapeakebay.net/calendar/event/21521
- December 13, 2013: http://www.chesapeakebay.net/calendar/event/21131/
- November 1, 2013: http://www.chesapeakebay.net/calendar/event/21024/
- October 31, 2013: http://www.chesapeakebay.net/calendar/event/21023/
- August 28-29, 2013: www.chesapeakebay.net/calendar/event/20832/
- July 31, 2013: www.chesapeakebay.net/calendar/event/19543/
- June 19, 2013: www.chesapeakebay.net/calendar/event/19542/
- December 6, 2012: www.chesapeakebay.net/calendar/event/18952/
- October 12, 2012: www.chesapeakebay.net/calendar/event/18810/

Water Quality Goal Implementation Team

- June 9, 2014: www.chesapeakebay.net/calendar/event/21214/
- January 14, 2013: http://www.chesapeakebay.net/calendar/event/18967/

- November 13, 2012: http://www.chesapeakebay.net/calendar/event/18150/
- October 9, 2012: http://www.chesapeakebay.net/calendar/event/18149/
- September 24, 2012: http://www.chesapeakebay.net/calendar/event/18727/
- September 10, 2012: http://www.chesapeakebay.net/calendar/event/18148/
- August 13, 2012: http://www.chesapeakebay.net/calendar/event/18147/
- July 16, 2012: http://www.chesapeakebay.net/calendar/event/18146/
- May 21, 2012: http://www.chesapeakebay.net/calendar/event/18144/
- April 9, 2012: www.chesapeakebay.net/calendar/event/18143/
- March 12, 2012: http://www.chesapeakebay.net/calendar/event/18046/
- February 13, 2012: http://www.chesapeakebay.net/calendar/event/17887/
- January 9, 2012: http://www.chesapeakebay.net/calendar/event/17704/
- November 14, 2011: www.chesapeakebay.net/calendar/event/13095/
- September 12, 2011: www.chesapeakebay.net/calendar/event/13140/
- August 8, 2011: www.chesapeakebay.net/calendar/event/13148/
- June 13, 2011: http://www.chesapeakebay.net/calendar/event/13182/
- July 6, 2010: www.chesapeakebay.net/calendar/event/13389/
- September 29-30, 2009: www.chesapeakebay.net/calendar/event/18326/
- August 24, 2009: www.chesapeakebay.net/calendar/event/18330/

Habitats Goal Implementation Team

- May 22, 2012: www.chesapeakebay.net/calendar/event/18279/

Agriculture Workgroup

- August 8, 2014: www.chesapeakebay.net/calendar/event/21939/
- July 24, 2014: http://www.chesapeakebay.net/calendar/event/21224/
- July 22, 2014: http://www.chesapeakebay.net/calendar/event/21918/
- July 10, 2014: http://www.chesapeakebay.net/calendar/event/21905/
- June 19, 2014: http://www.chesapeakebay.net/calendar/event/21223/
- June 12, 2014: http://www.chesapeakebay.net/calendar/event/21761/
- May 22, 2014: http://www.chesapeakebay.net/calendar/event/21754/
- May 1, 2014: www.chesapeakebay.net/calendar/event/21221/
- March 13, 2014: www.chesapeakebay.net/calendar/event/21207/
- February 13, 2014: www.chesapeakebay.net/calendar/event/21207/
- January 30, 2014 : http://www.chesapeakebay.net/calendar/event/21206/
- December 12, 2013: http://www.chesapeakebay.net/calendar/event/19190/
- September 26, 2013: http://www.chesapeakebay.net/calendar/event/19187/
- August 8, 2013: http://www.chesapeakebay.net/calendar/event/19186/
- July 11, 2013: http://www.chesapeakebay.net/calendar/event/19185/
- June 20, 2013: www.chesapeakebay.net/calendar/event/20725/

- May 9, 2013: http://www.chesapeakebay.net/calendar/event/19183/
- April 11, 2013: http://www.chesapeakebay.net/calendar/event/19182/
- February 14, 2013: http://www.chesapeakebay.net/calendar/event/19180/
- January 10, 2013: http://www.chesapeakebay.net/calendar/event/19070/
- November 29, 2012: http://www.chesapeakebay.net/calendar/event/19011/
- October 11, 2012: http://www.chesapeakebay.net/calendar/event/18692/
- September 20, 2012: http://www.chesapeakebay.net/calendar/event/18626/
- August 9, 2012: http://www.chesapeakebay.net/calendar/event/18581/
- July 19, 2012: http://www.chesapeakebay.net/calendar/event/17696/
- June 14, 2012: http://www.chesapeakebay.net/calendar/event/18322/
- May 10, 2012: http://www.chesapeakebay.net/calendar/event/18253/
- March 8, 2012: http://www.chesapeakebay.net/calendar/event/18040/
- February 23, 2012: http://www.chesapeakebay.net/calendar/event/17876/
- January 12, 2012: http://www.chesapeakebay.net/calendar/event/17697/

Forestry Workgroup

- June 5, 2013: www.chesapeakebay.net/calendar/event/20728/
- February 6, 2013: http://www.chesapeakebay.net/calendar/event/19238/
- August 1, 2012: http://www.chesapeakebay.net/calendar/event/18577/
- June 6, 2012: http://www.chesapeakebay.net/calendar/event/18386/
- March 6, 2012: http://www.chesapeakebay.net/calendar/event/18030/
- February 1, 2012: http://www.chesapeakebay.net/calendar/event/17705/

Urban Stormwater Workgroup

- January 21, 2014: http://www.chesapeakebay.net/calendar/event/21146/
- November 27, 2012: http://www.chesapeakebay.net/calendar/event/18547/
- October 16, 2012: http://www.chesapeakebay.net/calendar/event/18546/
- August 14, 2012: http://www.chesapeakebay.net/calendar/event/18487/
- April 30, 2012: http://www.chesapeakebay.net/calendar/event/18220/
- March 20, 2012: http://www.chesapeakebay.net/calendar/event/18069/
- February 8, 2012: http://www.chesapeakebay.net/calendar/event/17888/
- October 25, 2011: www.chesapeakebay.net/calendar/event/13109/

Wastewater Treatment Workgroup

- January 14, 2014: http://www.chesapeakebay.net/calendar/event/21134/
- December 16, 2013: http://www.chesapeakebay.net/calendar/event/19155/
- March 5, 2013: www.chesapeakebay.net/calendar/event/19145/
- January 16, 2013: www.chesapeakebay.net/calendar/event/19074/
- December 4, 2012: www.chesapeakebay.net/calendar/event/18611/

- September 4, 2012: www.chesapeakebay.net/calendar/event/18608/
- July 10, 2012: www.chesapeakebay.net/calendar/event/18324/
- April 3, 2012: www.chesapeakebay.net/calendar/event/18154/
- February 7, 2012: www.chesapeakebay.net/calendar/event/17868/

Wetlands Action Team

- May 21, 2013: www.chesapeakebay.net/calendar/event/19519/

Scientific and Technical Advisory Committee

- March 12, 2013: http://www.chesapeake.org/stac/meeting.php?activity_id=216
- December 4, 2012: http://www.chesapeake.org/stac/meeting.php?activity_id=220
- March 28, 2012: http://www.chesapeake.org/stac/meeting.php?activity_id=200

Citizens' Advisory Committee

- February 22, 2013: www.chesapeakebay.net/calendar/event/19067/
- March 1, 2012: www.chesapeakebay.net/calendar/event/17761/
- November 17, 2011: www.chesapeakebay.net/calendar/event/13091/

Local Government Advisory Committee

- April 12, 2013: www.chesapeakebay.net/calendar/event/19233/
- March 1, 2012: www.chesapeakebay.net/calendar/event/17709/

Management Board

- September 11, 2014: www.chesapeakebay.net/calendar/event/21459/
- April 11, 2013: www.chesapeakebay.net/calendar/event/18753/
- September 13, 2012: www.chesapeakebay.net/calendar/event/18086/
- May 9, 2012: www.chesapeakebay.net/calendar/event/18082/
- February 9, 2012: www.chesapeakebay.net/calendar/event/17872/

For the following meetings and conference calls, the MB was provided a detailed written update:

- November 14, 2012: www.chesapeakebay.net/calendar/event/18088/
- August 2, 2012: www.chesapeakebay.net/calendar/event/18085/
- April 11, 2012: www.chesapeakebay.net/calendar/event/18081/
- March 6, 2012: www.chesapeakebay.net/calendar/event/18027/

Principals' Staff Committee

- March 7, 2013: www.chesapeakebay.net/calendar/event/19314/
- December 5, 2012: www.chesapeakebay.net/calendar/event/19044/
- February 16, 2012: www.chesapeakebay.net/calendar/event/17880/

Appendix O. Verification Guidance Development and Review Process

The six technical workgroups—Agriculture, Forestry, Urban Stormwater, Wastewater Treatment, Wetlands, and Streams—developed their source sector and habitat specific BMP verification guidance over the course of their normal schedules of workgroup conference calls and face-to-face meetings. Each set of verification guidance underwent numerous reviews as drafts and revisions were distributed among workgroup members and interested parties, discussed by the workgroup, and direction from the collective workgroup membership was given on further changes to be made. Although each set of guidance was developed independently by the six workgroups, the workgroups were all using the same set of five BMP verification principles (see Appendix A) to guide the verification guidance development process. In addition, all six workgroups collectively presented incrementally updated draft versions of their respective protocols to the BMP Verification Committee and then the BMP Verification Review Panel, respectively, over the course of spring 2012 through summer 2013, receiving detailed feedback and direction along the way.

After more than a year in development, the six technical workgroups provided the BMP Verification Committee with their recommended BMP verification protocols in early July 2013. These recommended verification protocols were incorporated into the July 15, 2013 draft of this document and distributed to members of the BMP Verification Review Panel and the BMP Verification Committee for their review over the course of the summer. The BMP Verification Review Panel developed the formal comments, responses, and recommendations during their August 28-29, 2013 meeting[1] and follow-up October 31, 2013[2] and November 1, 2013[3] conference calls, all of which were contained within the Panel's November 19, 2013 recommendations document[4]. The Panel's recommendations to the workgroups are provided in Appendix D. The six workgroups provided their revised verification guidance documents to the BMP Verification Committee in early February 2014 for incorporation into the revised draft version of this document which was then distributed to members of the BMP Verification Review Panel and the BMP Verification Committee for their review and comment at the Panel's April 1, 2014 meeting and the joint Committee/Panel meeting on April 2, 2014.

[1] http://www.chesapeakebay.net/calendar/event/20832
[2] http://www.chesapeakebay.net/calendar/event/21023/
[3] http://www.chesapeakebay.net/calendar/event/21024/
[4] Chesapeake Bay Program Partnership BMP Verification Review Panel's Guidance and Recommendations to the Six Source Sector Workgroups, the CBP BMP Verification Committee, and the Seven Watershed Jurisdictions. Distributed November 19, 2013. http://www.chesapeakebay.net/channel_files/21511/cbp_bmp_verif_review_panel_recommendations_11_19_2013.pdf

Table O-1. Summary of the BMP Verification Review Panel's recommendations to the six technical workgroups.

- Workgroups provide guidance, the jurisdictions develop protocols.
- Use the Urban Stormwater Workgroup's narrative as a model to follow.
- Use the Panel's Verification Program Design Matrix in the form of a checklist in developing the workgroup's guidance.
- Consider the Panel's 14-steps when developing the workgroup's verification guidance.
- Use the Panel's State Protocol Components Checklist as a checklist for ensuring the guidance provides each jurisdiction with the workgroup's best insights how to address.
- Consider the need for the jurisdictions to submit any additional documents for protocol approval beyond referencing the workgroup's guidance.
- Consider the Panel's comments on workgroup's previous draft guidance.
- Group practices and verification options together within the workgroup's guidance.
- Aim high: provide recommendations on "robust" levels of verification.
- Define how to verify and at what frequency.
- Address inspection frequency for functional equivalents.
- Provide guidance on intensity of verification choices.
- Confirm cross-walks between CBP BMPs and NRCS/State BMP practice design definitions/standards.
- Establish practice life spans and use within the workgroup's verification guidance.
- Enable adaptation in the jurisdictions' verification protocols with the use of emerging technologies in conducting the actual verification procedures.

Achieving Internal Consistency Across the Workgroups' Guidance

The BMP Verification Committee, with the direct assistance of the BMP Verification Review Panel, worked to ensure there was a common 'level of fairness' in the expectations expressed within each workgroup's set of verification guidance. Below are summaries of the specific steps taken to ensured a level of internal consistency across the workgroups' guidance.

Ensuring Equity Across Sectors/ Habitats

The BMP Verification Review Panel's set of 14 specific recommendations directed at all six technical workgroups (see Attachment B, Appendix D) provided a uniform charge to all six workgroups and established a common bar for each workgroup to strive for in their respective guidance documents. The Panel's call for use of the Urban Stormwater Workgroup's verification guidance narrative as a template for use by the other five workgroups ensured each set of guidance addressed a common suite of elements and was written in a form understandable by readers not as familiar with each source sector and habitat.

Application of the Panel's Verification Program Design Matrix

The BMP Verification Review Panel developed a *Chesapeake Bay Program BMP Verification Program Design Matrix* (see Section 3) which outlined three recommended program components

along with the underlying program elements of a jurisdiction's verification program. The Panel saw the workgroups using the matrix essentially as a checklist to ensure their guidance was addressing all the program elements the Panel envisioned within each jurisdiction's verification program.

Use of the Panel's 14 Verification Program Development Steps

The *Jurisdictional BMP Verification Program Development Decision Steps for Implementation* developed by the BMP Verification Review Panel (see Section 3) spells out the 14 steps for each Chesapeake Bay watershed jurisdiction to consider when developing their jurisdiction's BMP verification program. Under each step are a series of questions for consideration which will prompt decisions that may be needed to develop the jurisdiction's verification protocols. The Panel envisioned the workgroups using the 14 steps as prompts to ensure their respective guidance provided the jurisdictions with part of the information needed to answer the questions under each step.

State Verification Protocol Components Checklist

The *State Verification Protocol Components Checklist* (see Section 3) developed by the BMP Verification Review Panel was provided to the workgroup as a checklist to ensure their guidance was addressing all the components the Panel envisioned within each jurisdiction's verification protocols.

Practices Which Cross Source Sector/Habitat Boundaries

The workgroup chairs and coordinators worked collectively to clearly define which specific set of workgroup verification guidance applied to practices which could apply across two or more source sectors or habitats. In each of these cases, whether it is wetlands restoration or tree planting, each workgroup's verification guidance clearly spells out the appropriate guidance the jurisdictions should follow for those practices spanning multiple source sectors or habitats.

Verification of Management Plan-based Practices

There is a significant verification challenge posed in ensuring practices which take the form of management plans are implemented and operating correctly. At the request of the BMP Verification Committee, the Agriculture Workgroup convened an expert panel to develop specific verification guidance for how jurisdictions could verify management plan-based practices.

Types of BMP Implementation

There were generally found to be three types of BMPs being implemented which required verification:

- Voluntary or required BMPs implemented with cost share support;
- Required BMPs without cost share support; and
- Voluntary BMPs implemented without cost share support.

Each of the workgroups provided upfront definitions and groupings of their BMPs and addressed how they recommended the jurisdictions verify the resultant categories of BMPs within their

guidance. Taking this approach ensured a level of consistency within and across the workgroup's guidance documents.

Key Phases for Verification

There are essentially three phases for verification common across most of the sectors and habitats:

- BMP installation (year 1)
- Post-BMP implementation while under a contract (state or federal cost share program) or regulatory oversight (state/federal permit)
- Post-BMP implementation after the contract expires and/or regulatory oversight ends

Each workgroup addressed how it recommended verifying practices under these phases, generally building off of and, in some cases, enhancing existing regulatory and permitting inspection and maintenance programs.

Recognizing Diversity of Choices in Conducting Verification

The six technical workgroups provided the jurisdictions with guidance, as recommended by the BMP Verification Review Panel, not specific protocols. It's each jurisdiction's responsibility for developing verification protocols which best address their implementation programs, local communities, and circumstances. As recognized in each workgroup's verification guidance document, the jurisdictions have choices to make within and across the source sectors and habitats in terms of the exact nature of their verification protocols.

To effectively illustrate the diversity of choices, Dr. Tim Gieseke, BMP Verification Review Panel member from Ag Resource Strategies in New Ulm, Minnesota, developed the illustration in Figure O-1.

Figure O-1. Illustration of Diversity of Verification Approaches Tailored to Reflect Practices

Sector	Inspected	Frequency	Timing	Method	Inspector	Data Recorded	Scale
Stormwater	All	Statistics	<1 year	Monitoring	Independent	Water quality data	Site
	Percentage	Targeting	1-3 yrs	Visual	Regulator	Meets Specs	Subwatershed
	Subsample	Law	3-5 yrs	Aerial	Non-Regulator	Visual functioning	County
	Targeted	Funding	>5 yrs	Phone Survey	Self	Location	State
Agriculture	All	Statistics	<1 year	Monitoring	Independent	Water quality data	Site
	Percentage	Targeting	1-3 yrs	Visual	Regulator	Meets Specs	Subwatershed

	Subsample	Law	3-5 yrs	Aerial	Non-Regulator	Visual functioning	County
	Targeted	Funding	>5 yrs	Phone Survey	Self	Location	State
Forestry	All	Statistics	<1 year	Monitoring	Independent	Water quality data	Site
	Percentage	Targeting	1-3 yrs	Visual	Regulator	Meets Specs	Subwatershed
	Subsample	Law	3-5 yrs	Aerial	Non-Regulator	Visual functioning	County
	Targeted	Funding	>5 yrs	Phone Survey	Self	Location	State

Figure O-1 illustrates the choices being made by the jurisdictions, following guidance from the workgroups, for specific practices within three representative source sectors—urban stormwater, agriculture, and forestry. Through application of the workgroups' guidance, choices can be made by the jurisdictions about how much of the practice population will be inspected, the underlying basis for the frequency on inspections, the timing for the inspections, the method of verification, who the inspector represents, the data reported, and the scale at which the data are reported out at.

APPENDIX P. Relative Load Reductions Analysis of Source Sectors and BMPs in the Jurisdictions' Phase II Watershed Implementation Plans (WIPs)

Analysis presented to the
BMP Verification Committee: March 13, 2013
Agriculture Workgroup: April 11, 2013
Urban Stormwater Workgroup: May 21, 2013
BMP Verification Review Panel: June 19, 2013

Objectives of analysis

- Identify and quantify the relative contribution among source sectors – and the contribution among BMPs within those sectors – to the nutrient and sediment load reductions needed to achieve the Phase II Watershed Implementation Plan (WIP) loading goals.

Methods

- Create a NO ACTION Scenario.
- Determine load reductions between Phase II WIP Scenario and NO ACTION.
- Isolate each BMP in a separate scenario using Scenario Builder processing rules.
- Determine load reductions from the isolated BMP scenario to the NO ACTION.
- Compare the load reductions from the isolated scenarios to those from the Phase II WIP to determine a percent share of the reductions attributable to each BMP.
- **For wastewater, the contribution to the total load reduction compares current discharges (2011) to WIP discharges while BMPs outside wastewater compare No-Action to WIPs.**

Table 1. Most Common Agricultural BMP Phase II WIP Acres Watershed-Wide

BMP	Acres
Conservation Plans	**6,811,304**
Enhanced Nutrient Application Management	**2,082,419**
Other Conservation-Till	**2,002,283**
Decision Agriculture	**1,143,587**
Cover Crop	**1,136,034**
Nutrient Application Management on Pasture	**1,033,992**
Nutrient Application Management on Crop	**995,989**
Prescribed Grazing	**948,389**
Land Retirement	**609,407**
Liquid & Poultry Injection	**371,823**
Continuous NoTill	**321,901**
Commodity Cover Crop	**307,143**
Precision Intensive Rotational Grazing	**286,210**
Forest Buffers	**277,913**
Crop Irrigation Management	**251,767**

Table 2. Most Common Urban BMP Phase II WIP Acres Watershed-Wide

BMP	Acres
Filtering Practices	**848,488**
Infiltration Practices	**655,730**
Wet Ponds & Wetlands	**411,753**
Extended Dry Ponds	**225,756**
Dry Ponds	**174,664**
Forest Harvesting BMPs	**164,821**
Extractive Erosion and Sediment Control	**149,635**
Forest Conservation	**113,977**
SWM by Era (1985-2002)	**98,803**
Street Sweeping	**89,474**
Erosion and Sediment Control	**83,551**
Retrofit Stormwater Management	**69,208**
SWM by Era (2002-2010)	**65,668**
Impervious Surface & Urban Growth Reduction	**61,956**
Abandoned Mine Reclamation	**61,285**

Table 3. Agricultural Practices used in the analysis

Land Retirement	Prescribed Grazing
Forest Buffers	Precision Intensive Rotational Grazing
Conservation Tillage	Mortality Composting
Cover Crop	Decision Agriculture
Animal Waste Management Systems	Forest Buffers on Fenced Pasture Corridor
Grass Buffers	Continuous NoTill
Enhanced Nutrient Application Management	Water Control Structures
Carbon Sequestration	Crop Irrigation Management
Conservation Plans	Enhanced Nutrient Application Management
Commodity Cover Crop	NonUrban Stream Restoration
Wetland Restoration	Loafing Lot Management
Decision Agriculture	Pasture Alternative Watering
Stream Access Control with Fencing	Conservation-Till Specialty Crops
Grass Buffers on Fenced Pasture Corridor	Tree Planting on Fenced Pasture Corridor
Dairy Precision Feeding	Poultry Phytase
Poultry Injection	Swine Phytase
Tree Planting	BioFilters
Capture & Reuse	Horse Pasture Management
Manure Transport	Lagoon Covers
Continuous NoTill	Nutrient Application Management on Crop
Barnyard Runoff Control	Ammonia Emission Reductions (Alum)
Liquid Injection	Prescribed Grazing

Table 4. Urban Practices used in the analysis

Infiltration Practices
Filtering Practices
Urban Nutrient Management
BioRetention
Wet Ponds & Wetlands
SWM by Era (2002-2010)
Forest Conservation Act
Forest Buffers
Extended Dry Ponds
Abandoned Mine Reclamation
Erosion and Sediment Control
Retrofit Stormwater Management
SWM by Era (1985-2002)
Extractive Erosion and Sediment Control
Urban Stream Restoration
Enhanced Construction Erosion and Sediment Control
Vegetated Open Channel
Impervious Surface Reduction
Tree Planting
Dry Ponds
Street Sweeping
Permeable Pavement
Urban Growth Reduction

Table 5. Other practices used in the analysis

Resource Practices		***Septic***	***Wastewater+CSO***
ForHarvestBMP	Forest Harvesting BMPs	[Septic Connections]	
DirtGravel	Dirt&Gravel Road E&S	[Septic Denitrification]	
		[Septic Pumping]	

Key for the following charts:

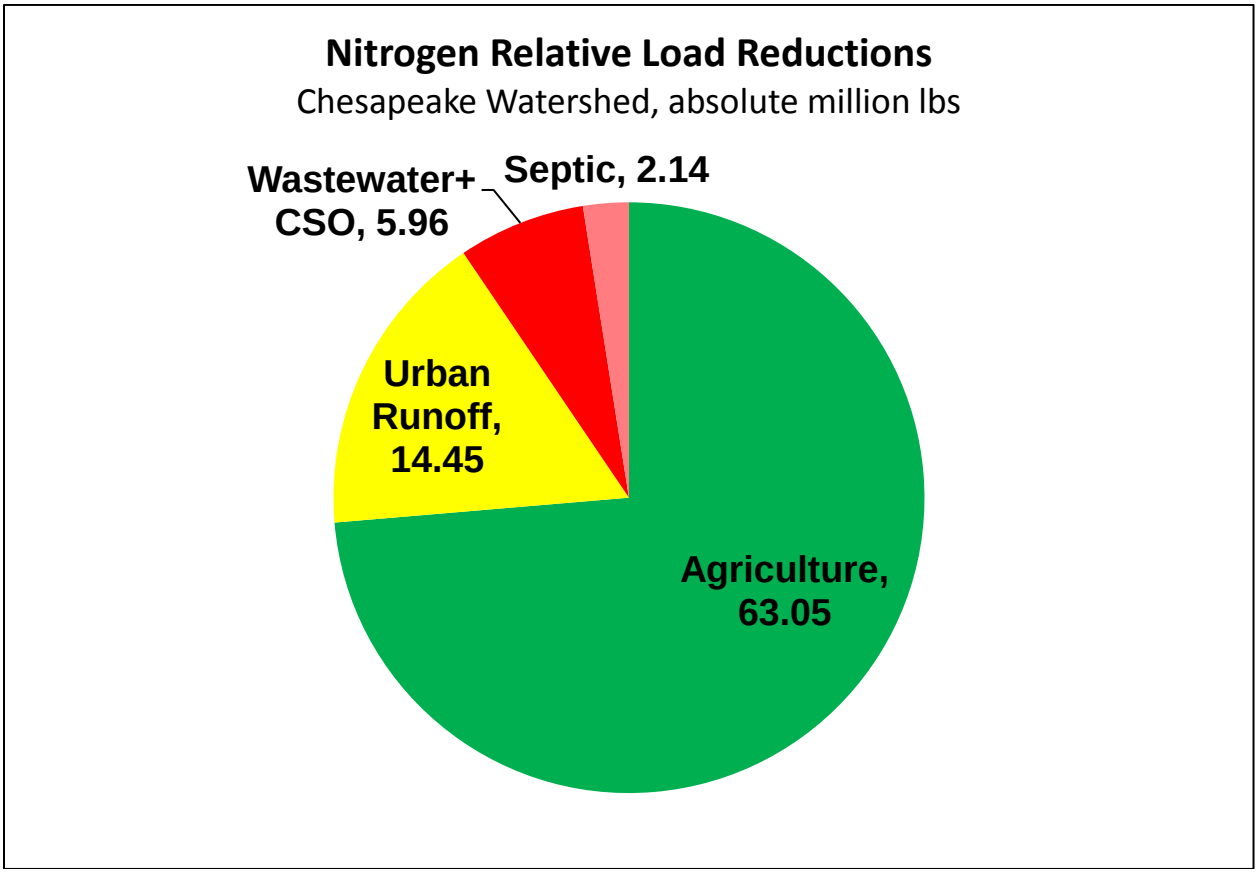
Green = Relative reduction from an agricultural BMP (from no action scenario)

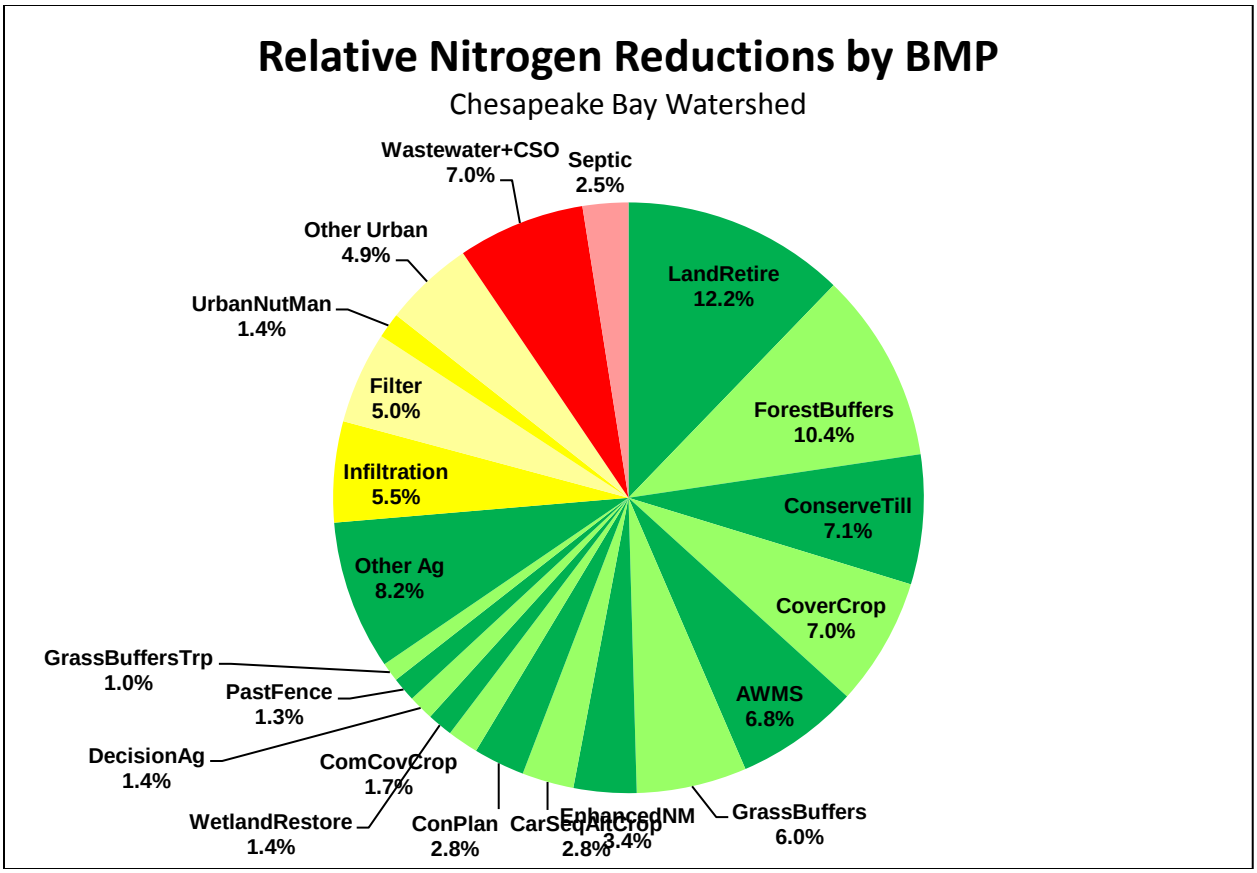
Yellow= Relative reduction from an urban stormwater BMP (from no action scenario)

Red = Wastewater + CSO reductions (from current 2011 load)

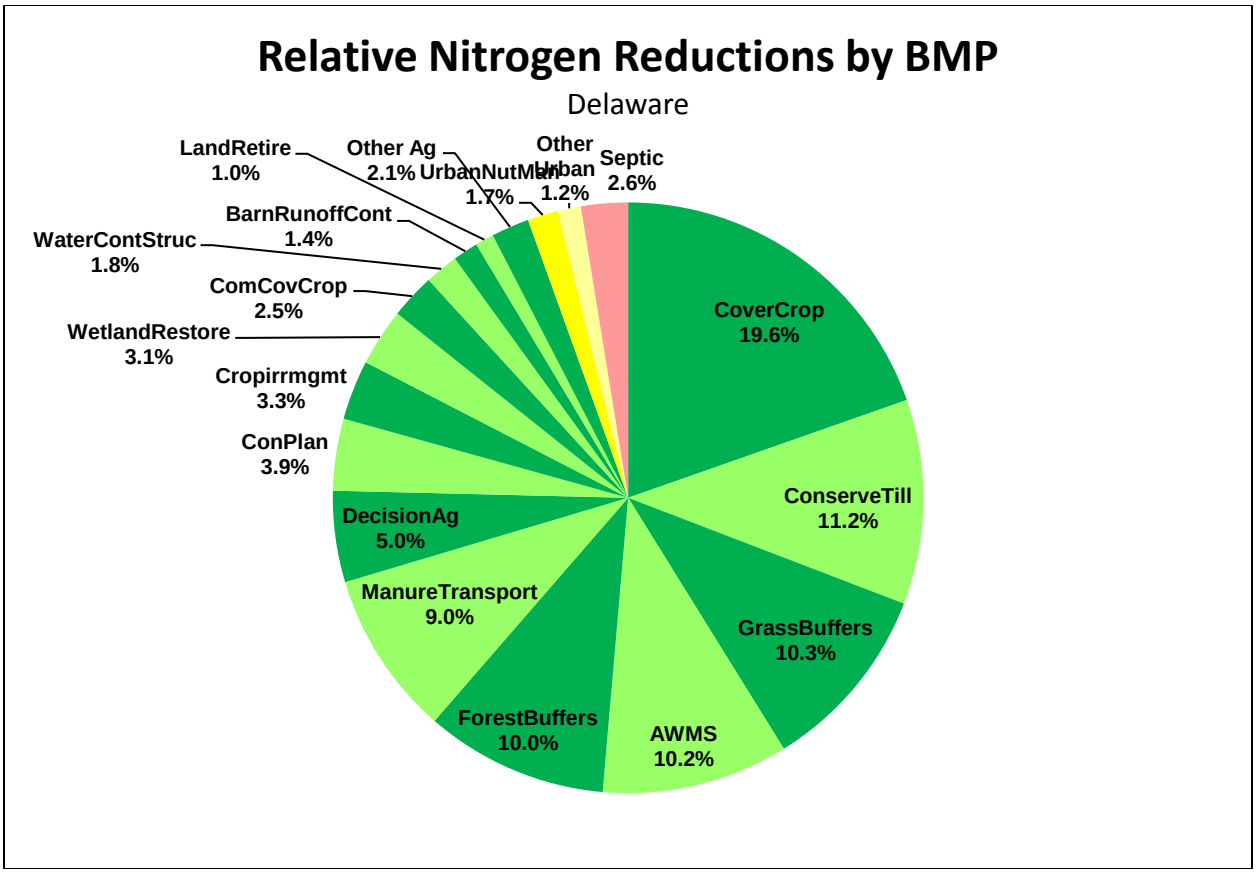
Pink = Septic reductions (from no action scenario)

Each slice in the following pie charts represents the percent of the total load reduction attributable to planned implementation levels for that BMP. For example, for the pie chart "Relative Nitrogen Reductions by BMP – Chesapeake Bay Watershed", land retirement represents 12.2% of the nitrogen reduction currently planned for by 2025, OR (85.6 million) X (.12) = 10.3 million pounds of N reduced. The retirement includes maintaining historic levels as well as new retirement called for in the states' plans.

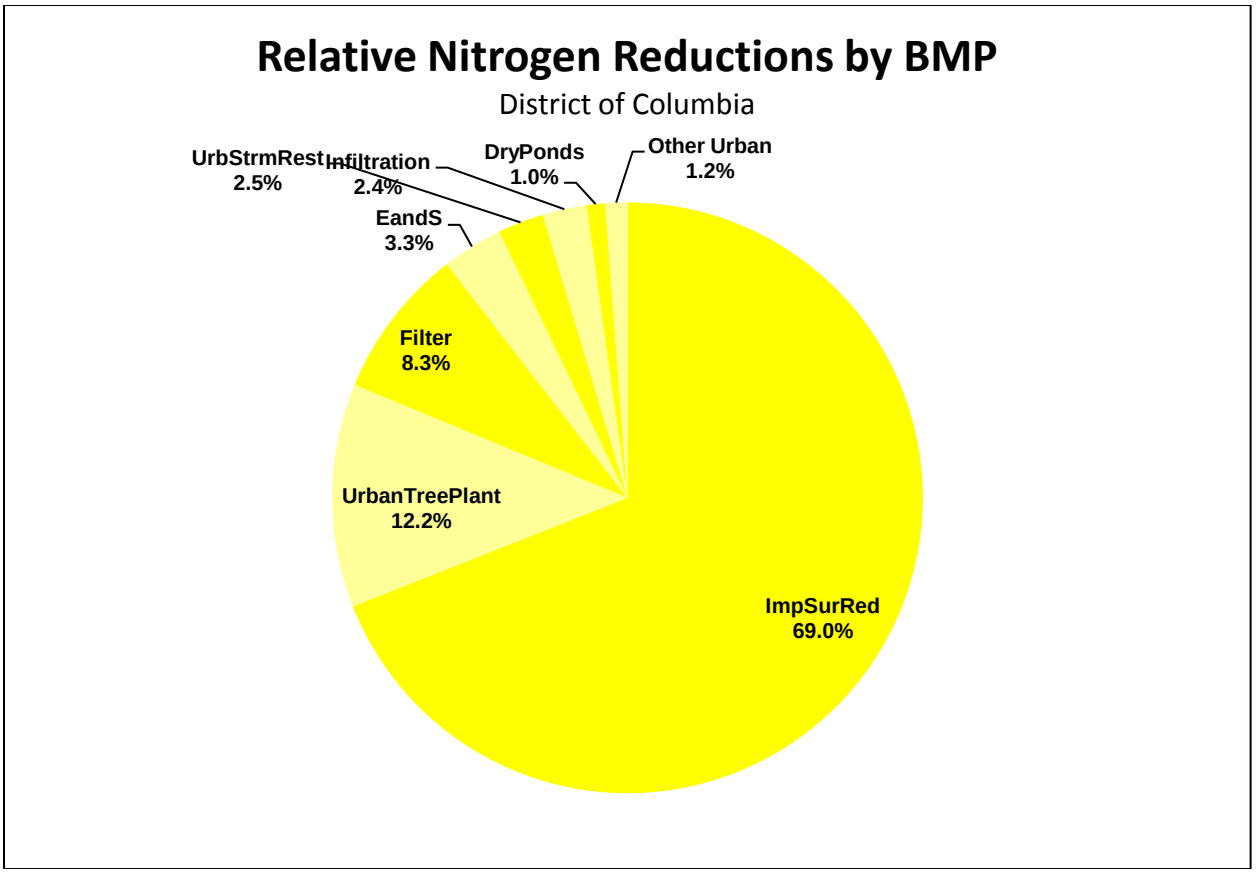

Nitrogen Relative Load Reductions
Chesapeake Watershed, absolute million lbs
Wastewater+ CSO, 5.96
Septic, 2.14
Urban Runoff, 14.45
Agriculture, 63.05



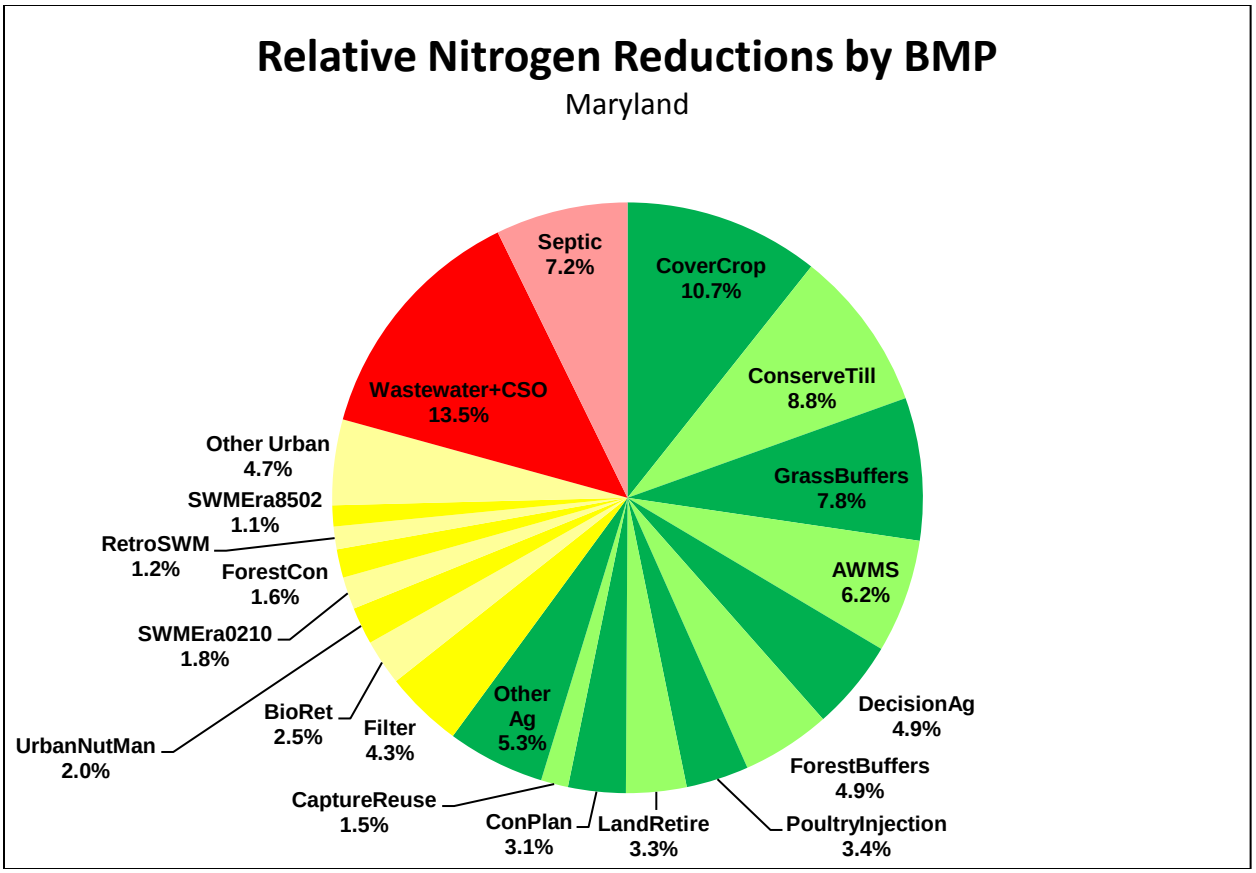
Chesapeake Bay Watershed			
BMP	**Relative Reduction**	**BMP**	**Relative Reduction**
Land Retirement	12.2%	Streamside Grass Buffers	1.0%
Forest Buffers	10.4%	Other Agriculture	8.2%
Conservation Tillage	7.1%	Urban Infiltration Practices	5.5%
Early Cover Crops	7.0%	Urban Filtering Practices	5.0%
Animal Waste Management System	6.8%	Urban Nutrient Management	1.4%
Grass Buffers	6.0%	Other Urban	4.9%
Enhanced Nutrient Management	3.4%	Forest Practices	0.0%
Alternative Crops	2.8%	Wastewater + CSO	7.0%
Soil Conservation and Water Quality Plans	2.8%	Septic	2.5%
Commodity Cover Crops	1.7%		
Wetland Restoration	1.4%		
Decision Agriculture	1.4%		
Stream Access Control with Fencing	1.3%		



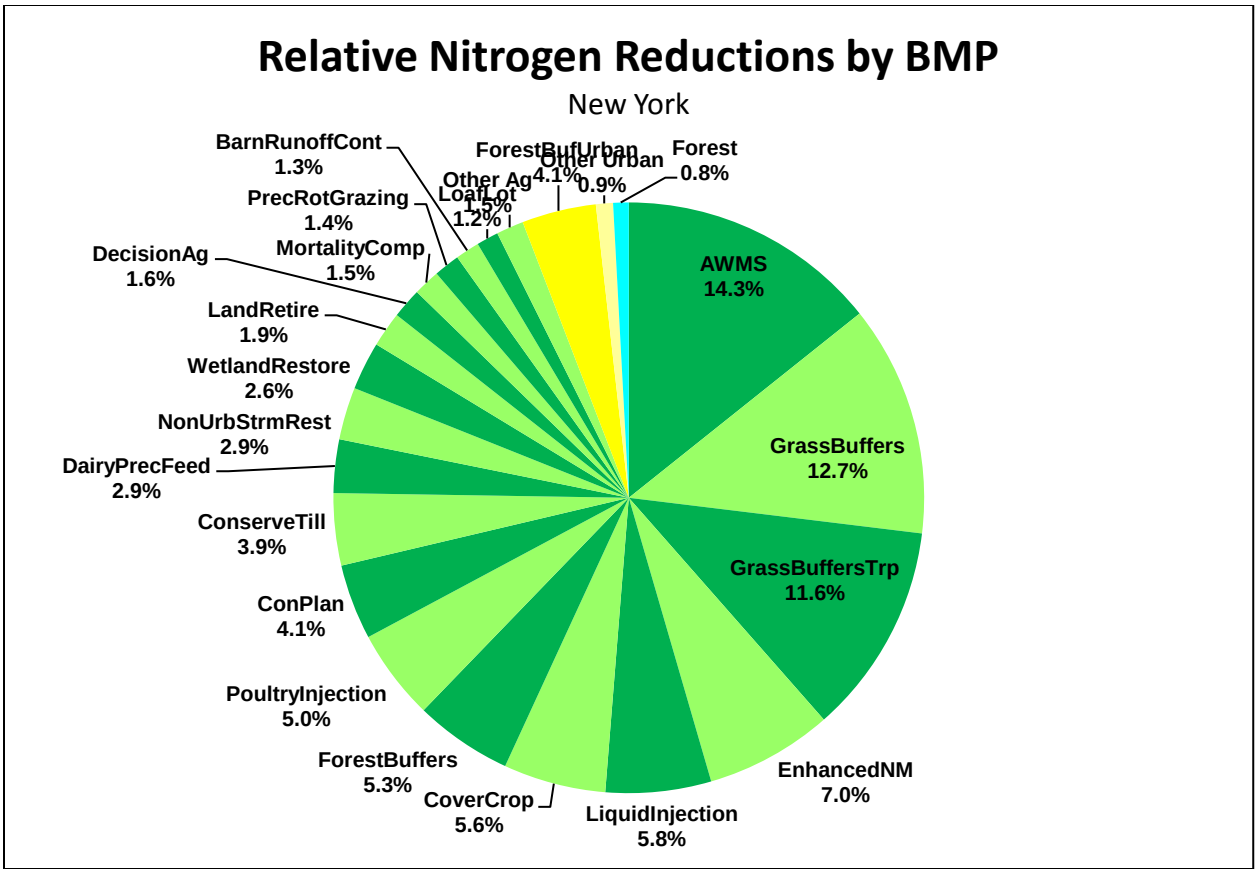
Delaware			
BMP	**Relative Reduction**	**BMP**	**Relative Reduction**
Early Cover Crops	19.6%	Land Retirement	1.0%
Conservation Tillage	11.2%	Other Agriculture	2.1%
Grass Buffers	10.3%	Urban Nutrient Management	1.7%
Animal Waste Management System	10.2%	Other Urban	1.2%
Forest Buffers	10.0%	Forest Practices	0.0%
Manure Transport	9.0%	Wastewater + CSO	0.0%
Decision Agriculture	5.0%	Septic	2.6%
Soil Conservation & Water Quality Plans	3.9%		
Cropland Irrigation Management	3.3%		
Wetland Restoration	3.1%		
Commodity Cover Crops	2.5%		
Water Control Structures	1.8%		
Barnyard Runoff Control	1.4%		



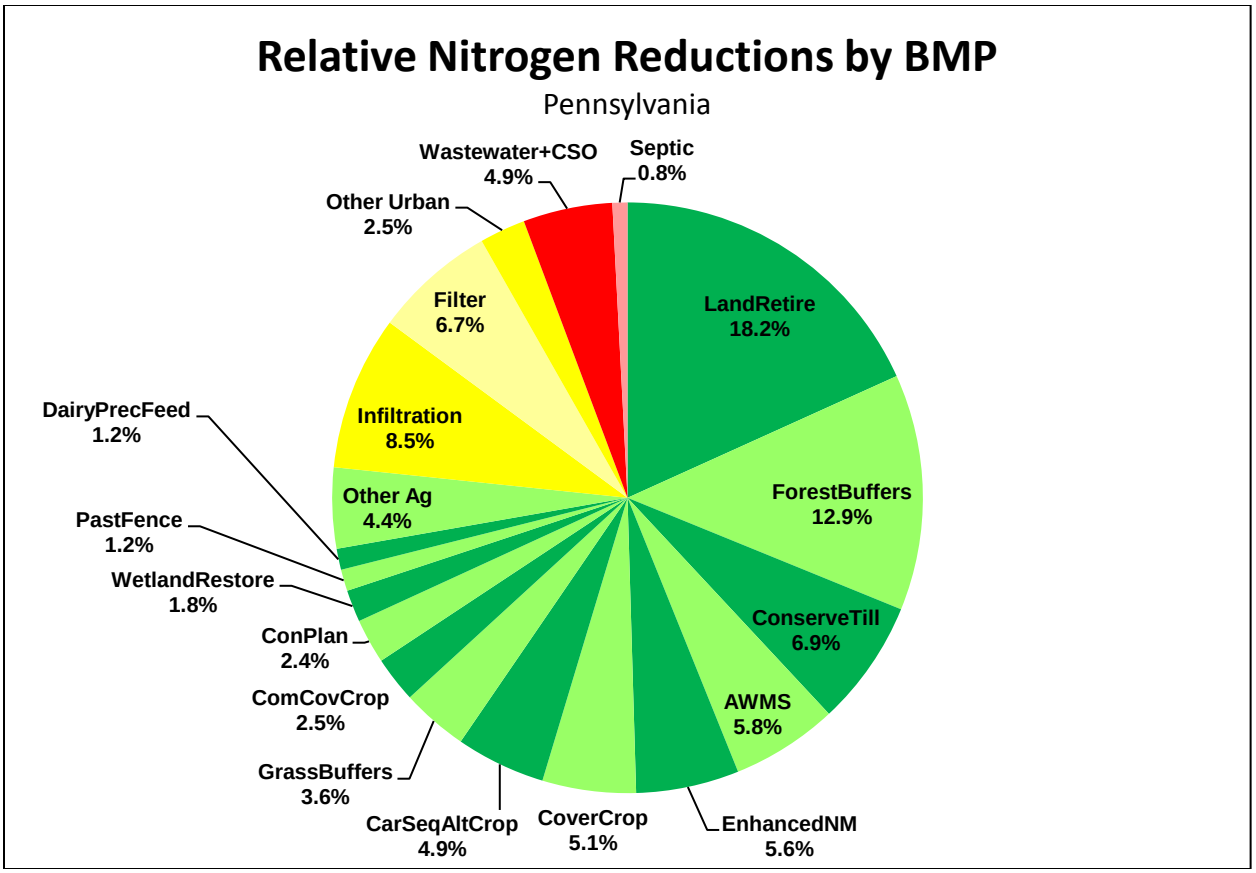
District of Columbia	
BMP	**Relative Reduction**
Impervious Urban Surface Reduction	69.0%
Urban Tree Planting; Urban Tree Canopy	12.2%
Urban Filtering Practices	8.3%
Erosion and Sediment Control	3.3%
Urban Stream Restoration	2.5%
Urban Infiltration Practices	2.4%
Dry Detention Ponds	1.0%
Other Urban	1.2%
Forest Practices	0.0%
Wastewater + CSO	0.0%



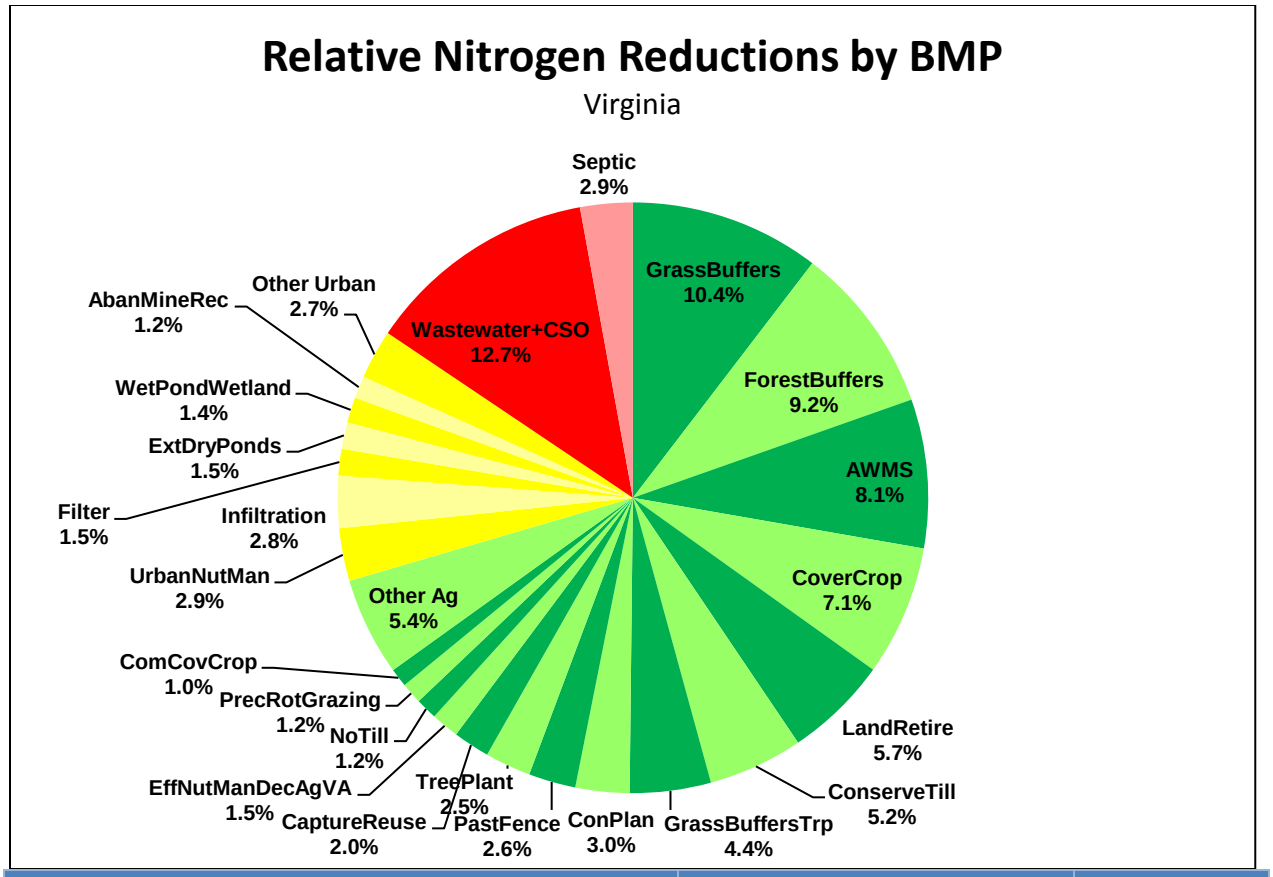
Maryland			
BMP	**Relative Reduction**	**BMP**	**Relative Reduction**
Early Cover Crops	10.7%	Urban Filtering Practices	4.3%
Conservation Tillage	8.8%	Bioretention/raingardens	2.5%
Grass Buffers	7.8%	Urban Nutrient Management	2.0%
Animal Waste Management System	6.2%	Stormwater Management (2002 to 2010), MD	1.8%
Decision Agriculture	4.9%	Forest Conservation	1.6%
Forest Buffers	4.9%	MS4 Permit-Required Stormwater Retrofit	1.2%
Poultry Litter Injection	3.4%	Stormwater Management (1985 to 2002), MD	1.1%
Land Retirement	3.3%	Other Urban	4.7%
Soil Conservation and Water Quality Plans	3.1%	Forest Practices	0.0%
Irrigation Water Capture Reuse	1.5%	Wastewater + CSO	13.5%
Other Agriculture	5.3%	Septic	7.2%



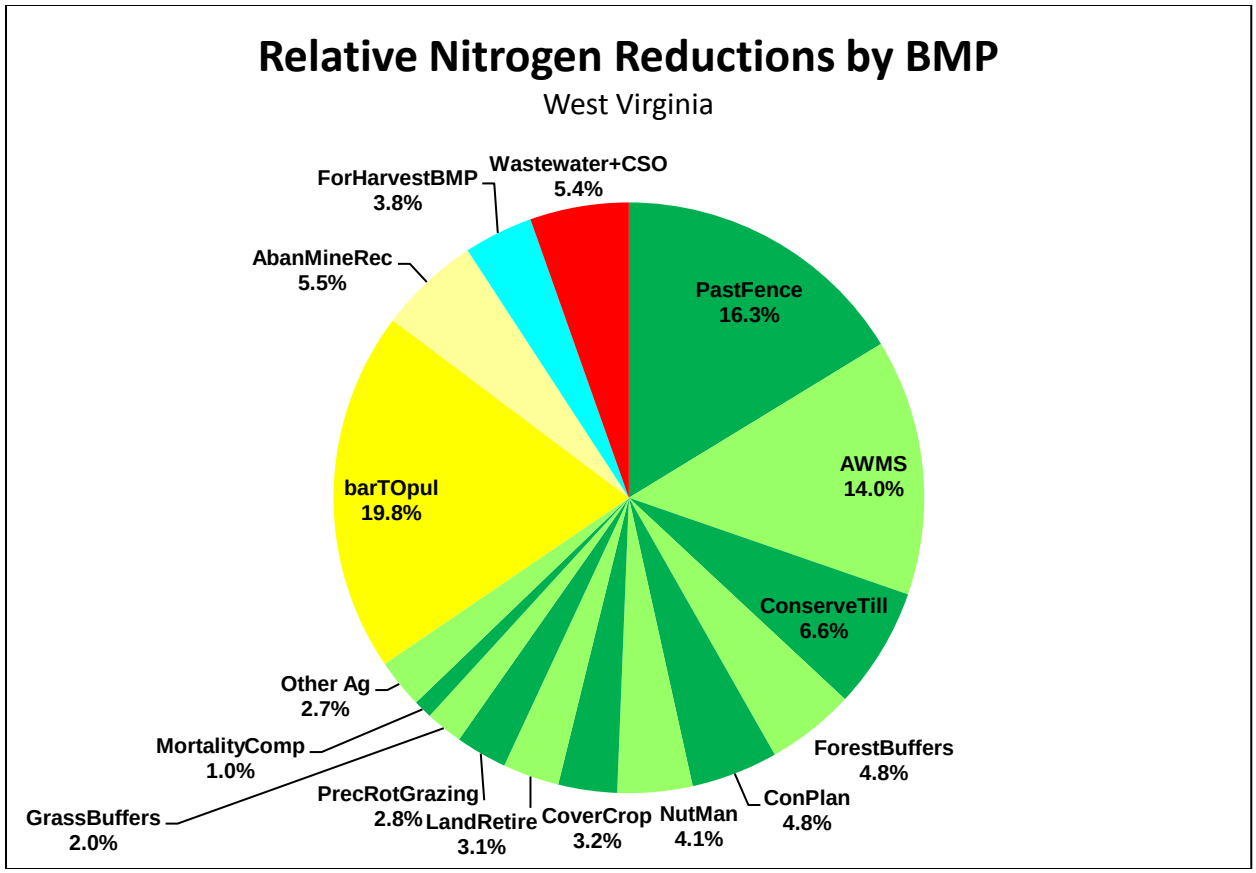
New York			
BMP	**Relative Reduction**	**BMP**	**Relative Reduction**
Animal Waste Management System	14.3%	Decision Agriculture	1.6%
Grass Buffers	12.7%	Mortality Composters	1.5%
Streamside Grass Buffers	11.6%	Prescribed Grazing	1.4%
Enhanced Nutrient Management	7.0%	Barnyard Runoff Control	1.3%
Dairy Manure Injection	5.8%	Loafing Lot Management	1.2%
Early Cover Crops	5.6%	Other Agriculture	1.5%
Forest Buffers	5.3%	Urban Forest Buffers	4.1%
Poultry Litter Injection	5.0%	Other Urban	0.9%
Soil Conservation & Water Quality Plans	4.1%	Forest Practices	0.8%
Conservation Tillage	3.9%	Wastewater + CSO	0.0%
Dairy Precision Feeding	2.9%	Septic	0.0%
Non Urban Stream Restoration	2.9%		
Wetland Restoration	2.6%		
Land Retirement	1.9%		



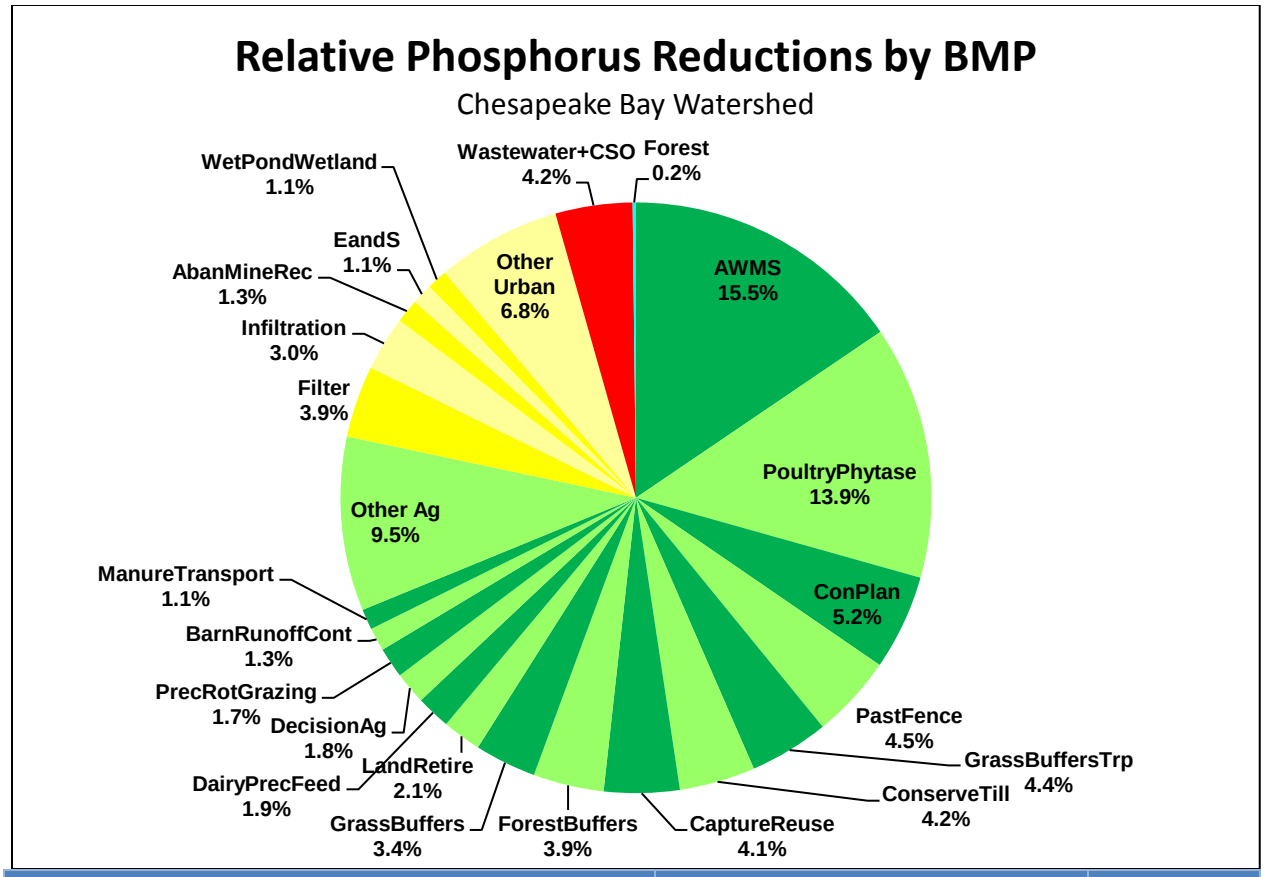
Pennsylvania			
BMP	**Relative Reduction**	**BMP**	**Relative Reduction**
Land Retirement	18.2%	Other Agriculture	4.4%
Forest Buffers	12.9%	Urban Infiltration Practices	8.5%
Conservation Tillage	6.9%	Urban Filtering Practices	6.7%
Animal Waste Management System	5.8%	Other Urban	2.5%
Enhanced Nutrient Management	5.6%	Forest Practices	0.0%
Early Cover Crops	5.1%	Wastewater + CSO	4.9%
Alternative Crops	4.9%	Septic	0.8%
Grass Buffers	3.6%		
Commodity Cover Crops	2.5%		
Soil Conservation and Water Quality Plans	2.4%		
Wetland Restoration	1.8%		
Stream Access Control with Fencing	1.2%		
Dairy Precision Feeding	1.2%		



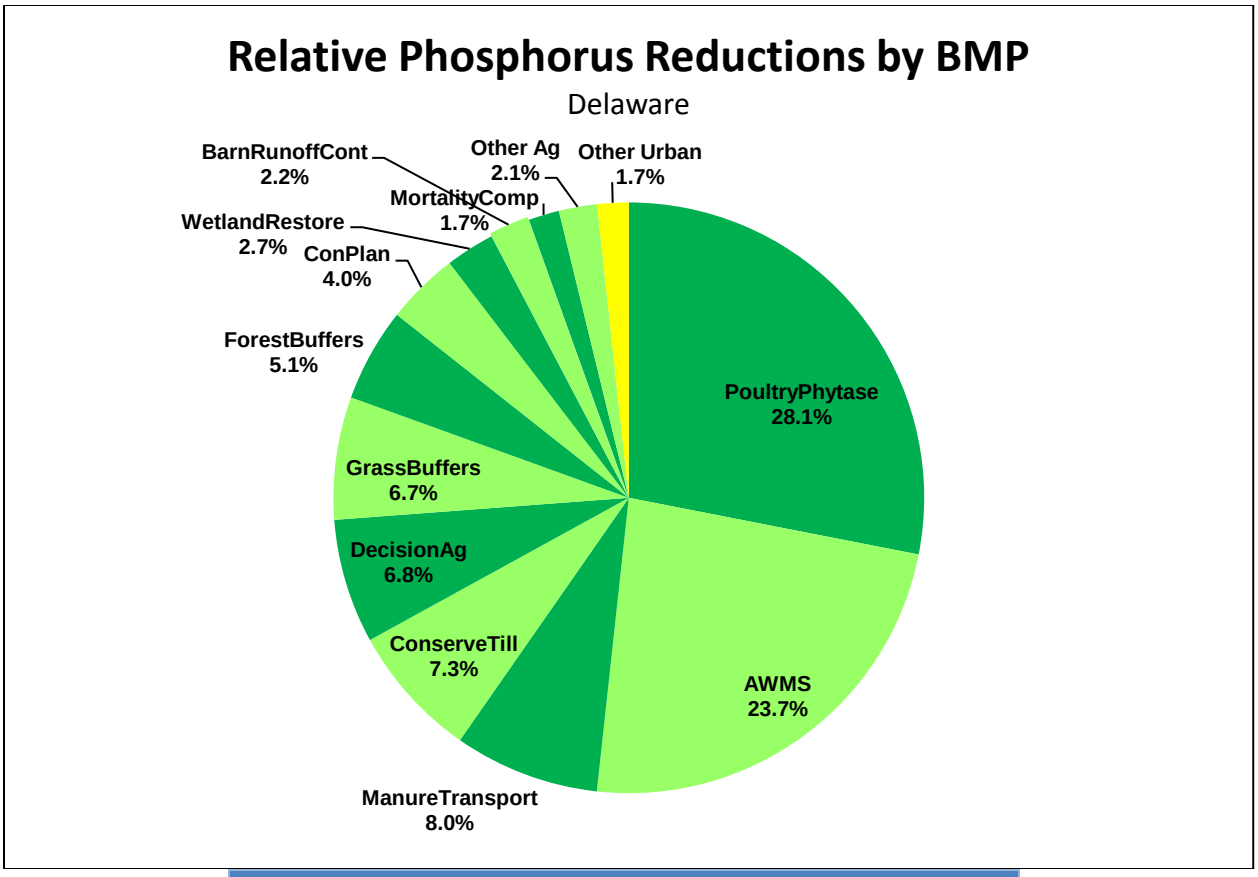
Virginia			
BMP	**Relative Reduction**	**BMP**	**Relative Reduction**
Grass Buffers	10.3%	Commodity Cover Crops	1.0%
Forest Buffers	9.1%	Other Agriculture	5.3%
Animal Waste Management System	8.1%	Urban Nutrient Management	2.9%
Early Cover Crops	7.1%	Urban Infiltration Practices	2.8%
Land Retirement	5.6%	Urban Filtering Practices	1.4%
Conservation Tillage	5.1%	Dry Extended Detention Ponds	1.4%
Streamside Grass Buffers	4.4%	Wet Ponds and Wetlands	1.4%
Soil Conservation and Water Quality Plans	2.9%	Abandoned Mine Reclamation	1.2%
Stream Access Control with Fencing	2.6%	Other Urban	2.7%
Tree Planting	2.5%	Forest Practices	0.9%
Irrigation Water Capture Reuse	2.0%	Wastewater + CSO	12.6%
Virginia Decision Agriculture	1.5%	Septic	2.8%
No Till (stackable)	1.2%		
Prescribed Grazing	1.1%		



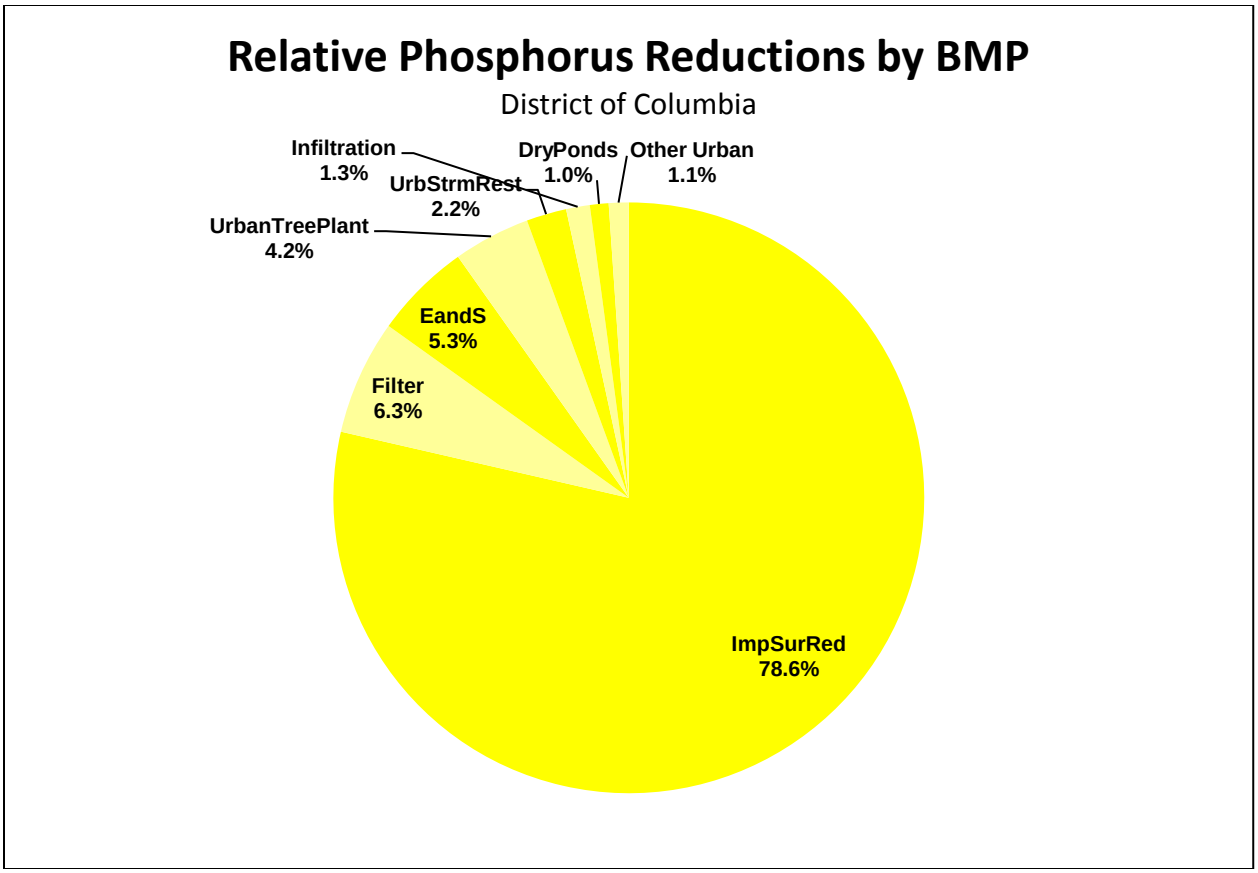
West Virginia			
BMP	**Relative Reduction**	**BMP**	**Relative Reduction**
Stream Access Control with Fencing	16.3%	Other Agriculture	2.7%
Animal Waste Management System	14.0%	Interim Erosion and Sediment Control	19.8%
Conservation Tillage	6.6%	Abandoned Mine Reclamation	5.5%
Forest Buffers	4.8%	Forest Harvesting Practices	3.8%
Soil Conservation and Water Quality Plans	4.8%	Wastewater + CSO	5.4%
Nutrient Management	4.1%	Septic	0.0%
Early Cover Crops	3.2%		
Land Retirement	3.1%		
Prescribed Grazing	2.8%		
Grass Buffers	2.0%		
Mortality Composters	1.0%		



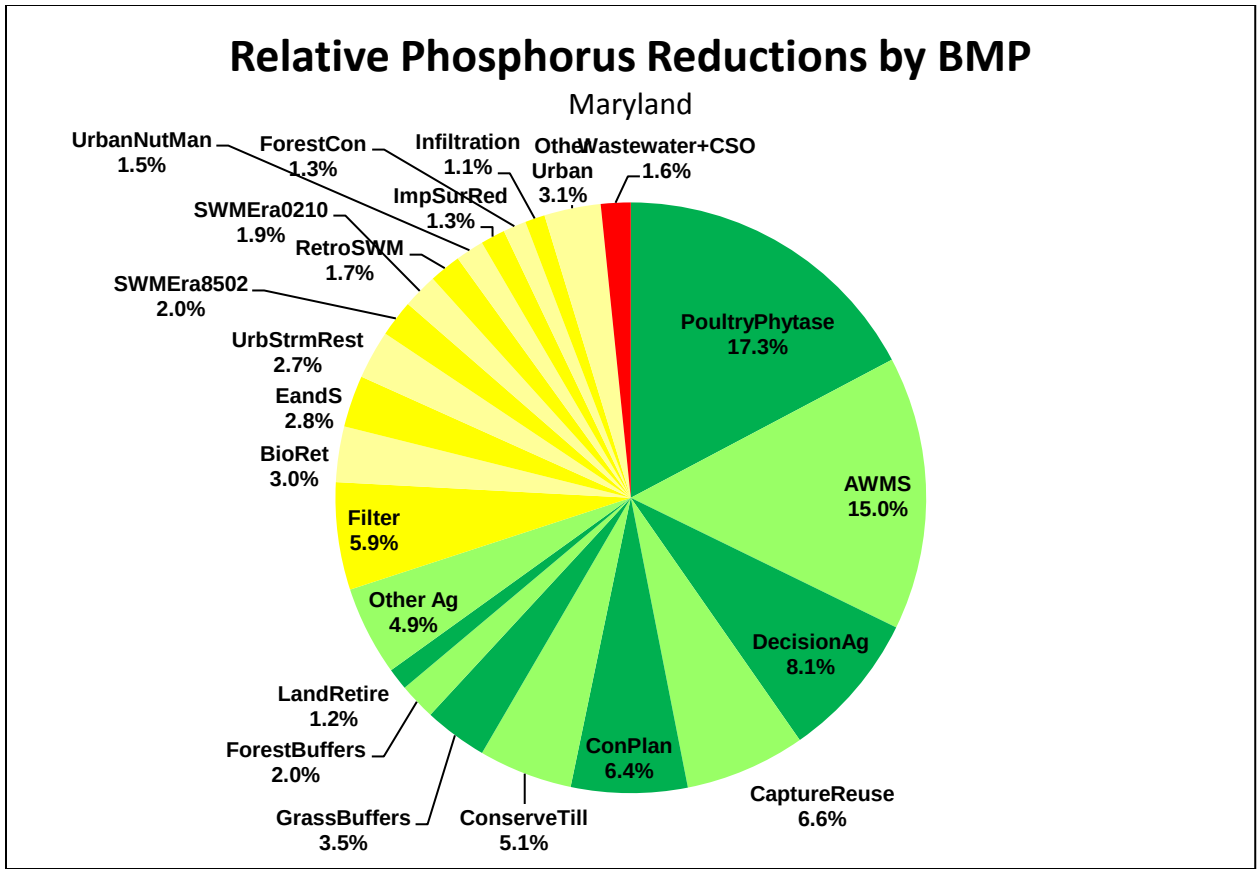
Chesapeake Bay Watershed			
BMP	**Relative Reduction**	**BMP**	**Relative Reduction**
Animal Waste Management System	15.5%	Prescribed Grazing	1.7%
Poultry Phytase	13.9%	Barnyard Runoff Control	1.3%
Soil Conservation and Water Quality Plans	5.2%	Manure Transport	1.1%
Stream Access Control with Fencing	4.5%	Other Agriculture	9.5%
Streamside Grass Buffers	4.4%	Urban Filtering Practices	3.9%
Conservation Tillage	4.2%	Urban Infiltration Practices	3.0%
Irrigation Water Capture Reuse	4.1%	Abandoned Mine Reclamation	1.3%
Forest Buffers	3.9%	Erosion and Sediment Control	1.1%
Grass Buffers	3.4%	Wet Ponds and Wetlands	1.1%
Land Retirement	2.1%	Other Urban	6.8%
Dairy Precision Feeding	1.9%	Forest Practices	0.2%
Decision Agriculture	1.8%	Wastewater + CSO	4.2%



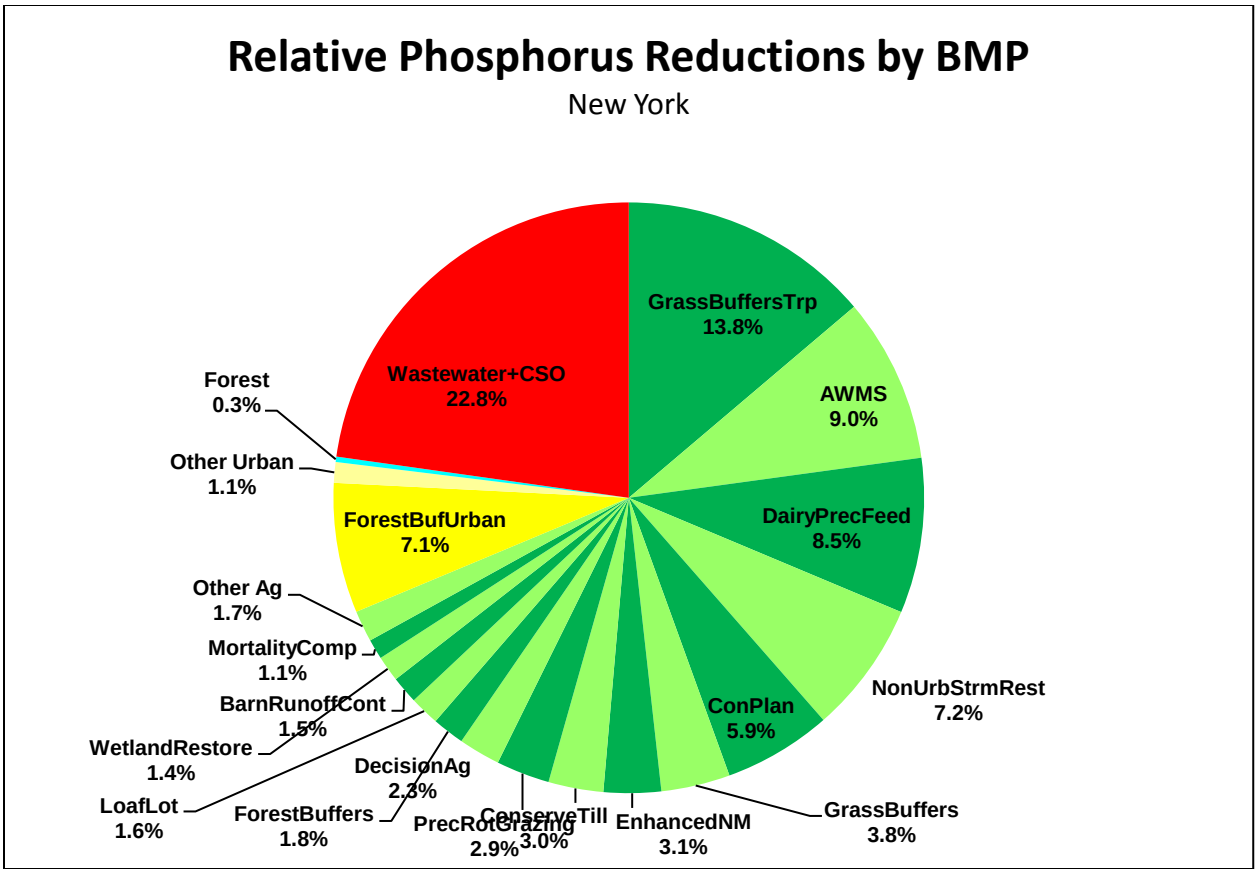
Delaware	
BMP	**Relative Reduction**
Poultry Phytase	28.1%
Animal Waste Management System	23.7%
Manure Transport	8.0%
Conservation Tillage	7.3%
Decision Agriculture	6.8%
Grass Buffers	6.7%
Forest Buffers	5.1%
Soil Conservation & Water Quality Plans	4.0%
Wetland Restoration	2.7%
Barnyard Runoff Control	2.2%
Mortality Composters	1.7%
Other Agriculture	2.1%
Other Urban	1.7%
Forest Practices	0.0%
Wastewater + CSO	0.0%



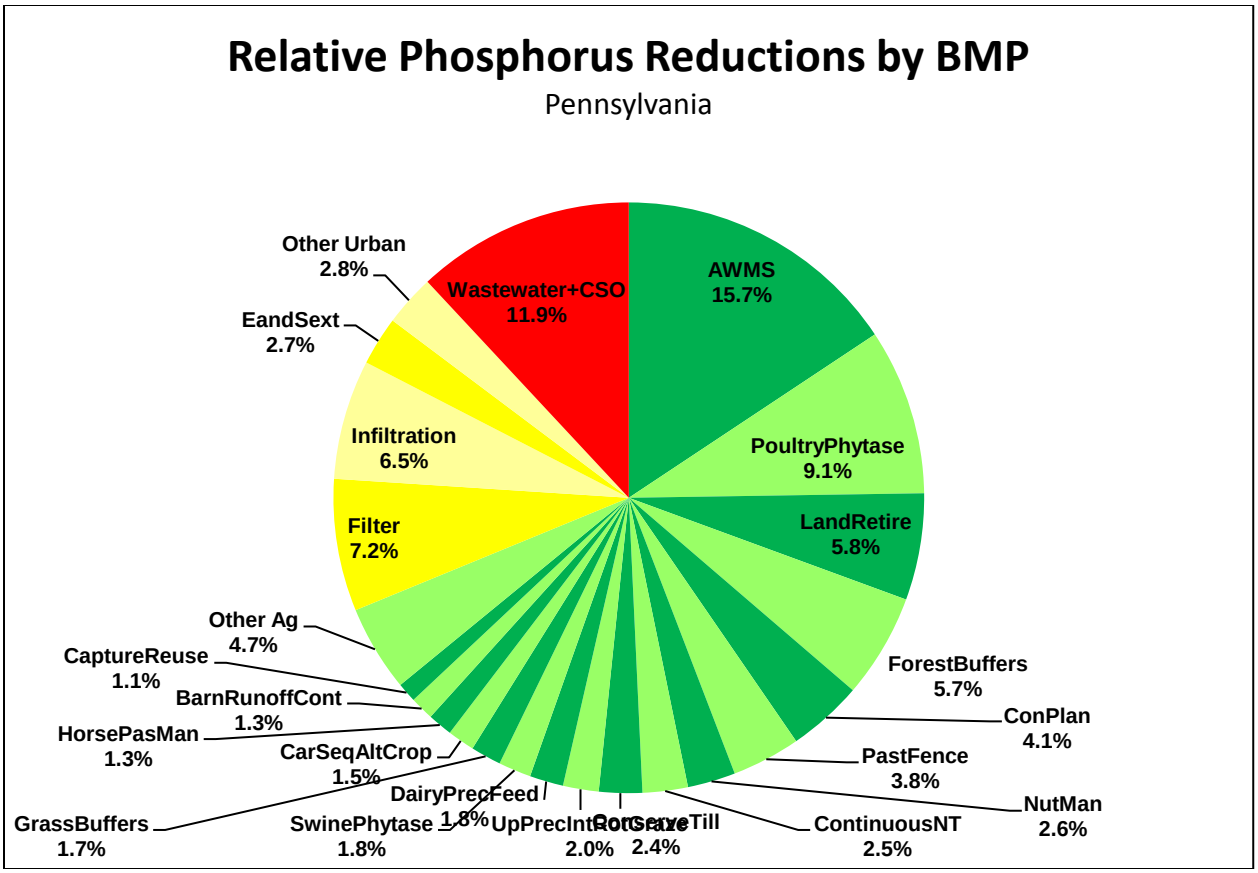
District of Columbia	
BMP	**Relative Reduction**
Impervious Urban Surface Reduction	78.6%
Urban Filtering Practices	6.3%
Erosion and Sediment Control	5.3%
Urban Tree Planting; Urban Tree Canopy	4.2%
Urban Stream Restoration	2.2%
Urban Infiltration Practices	1.3%
Dry Detention Ponds	1.0%
Other Urban	1.1%
Forest Practices	0.0%
Wastewater + CSO	0.0%



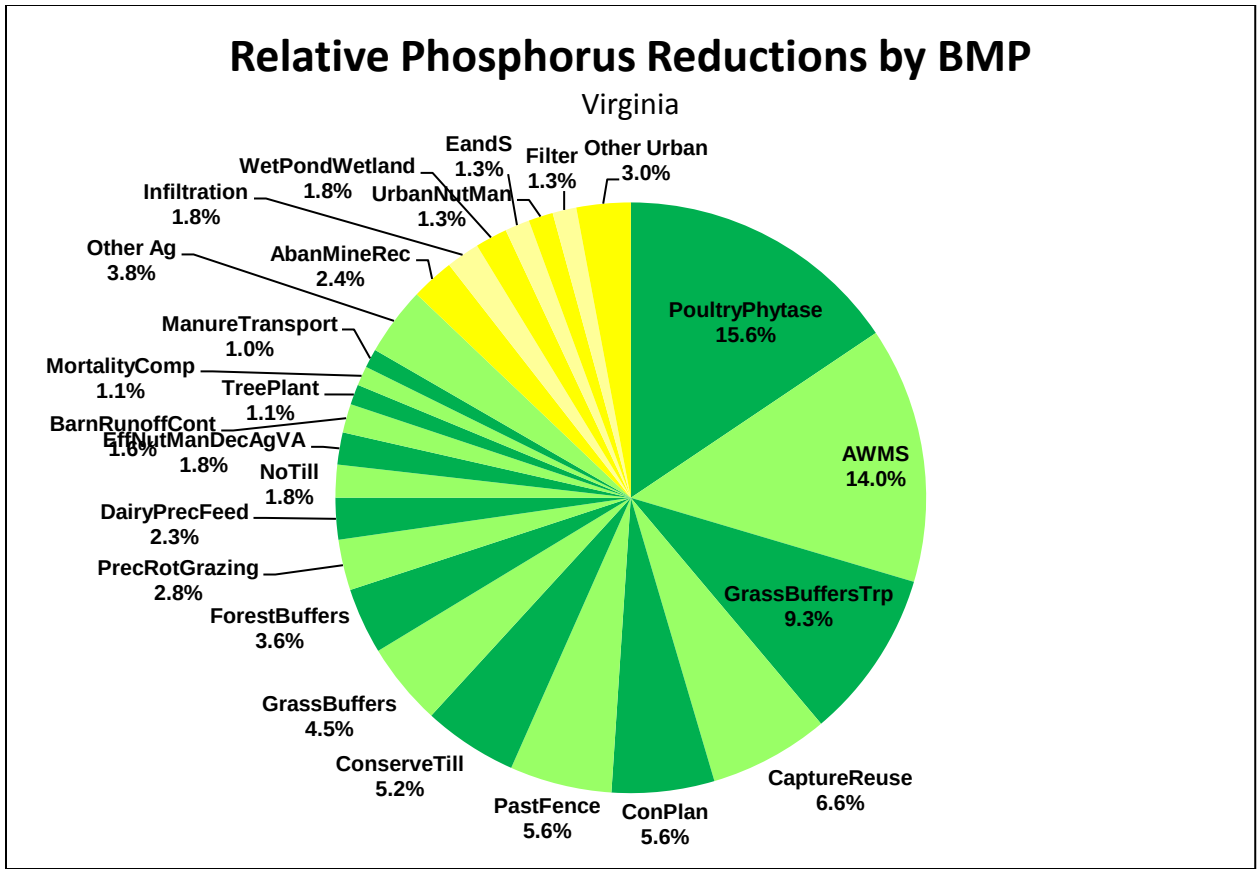
Maryland			
BMP	**Relative Reduction**	**BMP**	**Relative Reduction**
Poultry Phytase	17.3%	Erosion and Sediment Control	2.8%
Animal Waste Management System	15.0%	Urban Stream Restoration	2.7%
Decision Agriculture	8.1%	Stormwater Management (1985 to 2002), MD	2.0%
Irrigation Water Capture Reuse	6.6%	Stormwater Management (2002 to 2010), MD	1.9%
Soil Conservation and Water Quality Plans	6.4%	MS4 Permit-Required Stormwater Retrofit	1.7%
Conservation Tillage	5.1%	Urban Nutrient Management	1.5%
Grass Buffers	3.5%	Impervious Urban Surface Reduction	1.3%
Forest Buffers	2.0%	Forest Conservation	1.3%
Land Retirement	1.2%	Urban Infiltration Practices	1.1%
Other Agriculture	4.9%	Other Urban	3.1%
Urban Filtering Practices	5.9%	Forest Practices	0.0%
Bioretention/raingardens	3.0%	Wastewater + CSO	1.6%



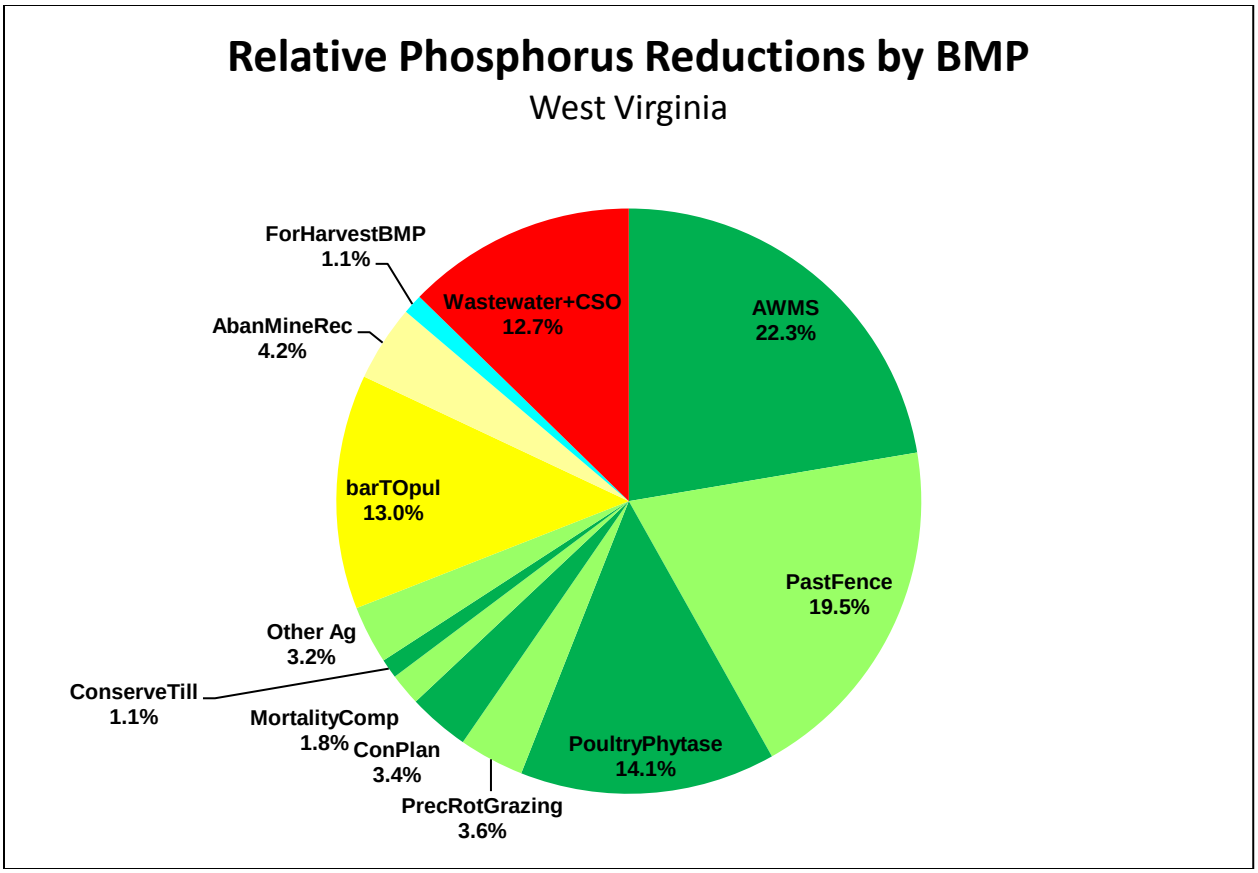
New York			
BMP	**Relative Reduction**	**BMP**	**Relative Reduction**
Streamside Grass Buffers	13.8%	Wetland Restoration	1.4%
Animal Waste Management System	9.0%	Mortality Composters	1.1%
Dairy Precision Feeding	8.5%	Other Agriculture	1.7%
Non Urban Stream Restoration	7.2%	Urban Forest Buffers	7.1%
Soil Conservation & Water Quality Plans	5.9%	Other Urban	1.1%
Grass Buffers	3.8%	Forest Practices	0.3%
Enhanced Nutrient Management	3.1%	Wastewater + CSO	22.8%
Conservation Tillage	3.0%		
Prescribed Grazing	2.9%		
Decision Agriculture	2.3%		
Forest Buffers	1.8%		
Loafing Lot Management	1.6%		
Barnyard Runoff Control	1.5%		



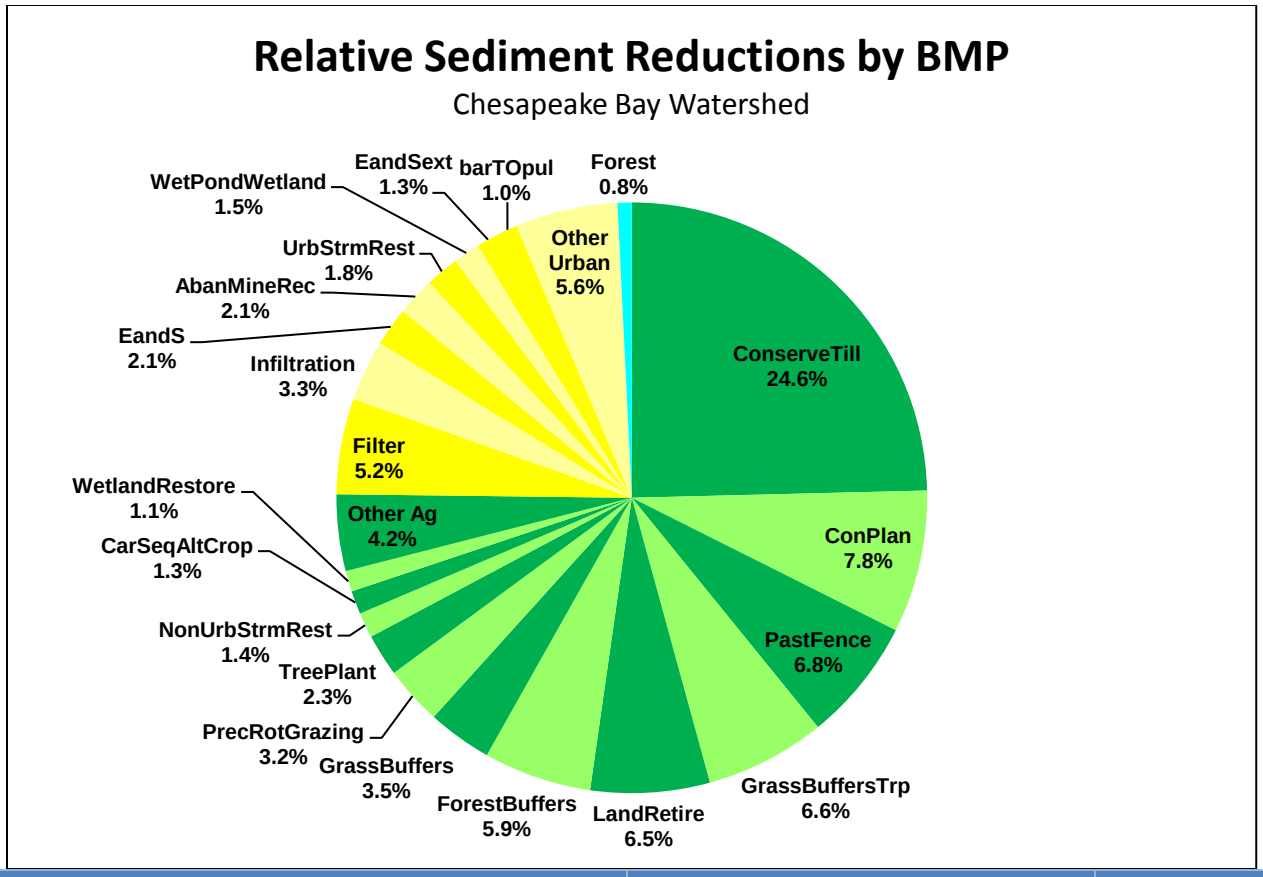
Pennsylvania			
BMP	**Relative Reduction**	**BMP**	**Relative Reduction**
Animal Waste Management System	15.7%	Grass Buffers	1.7%
Poultry Phytase	9.1%	Alternative Crops	1.5%
Land Retirement	5.8%	Horse Pasture Management	1.3%
Forest Buffers	5.7%	Barnyard Runoff Control	1.3%
Soil Conservation and Water Quality Plans	4.1%	Irrigation Water Capture Reuse	1.1%
Stream Access Control with Fencing	3.8%	Other Agriculture	4.7%
Nutrient Management	2.6%	Urban Filtering Practices	7.2%
Continuous No Till	2.5%	Urban Infiltration Practices	6.5%
Conservation Tillage	2.4%	Erosion and Sediment Control on Extractive	2.7%
Precision Intensive Rotational Grazing	2.0%	Other Urban	2.8%
Dairy Precision Feeding	1.8%	Forest Practices	0.0%
Swine Phytase	1.8%	Wastewater + CSO	11.9%



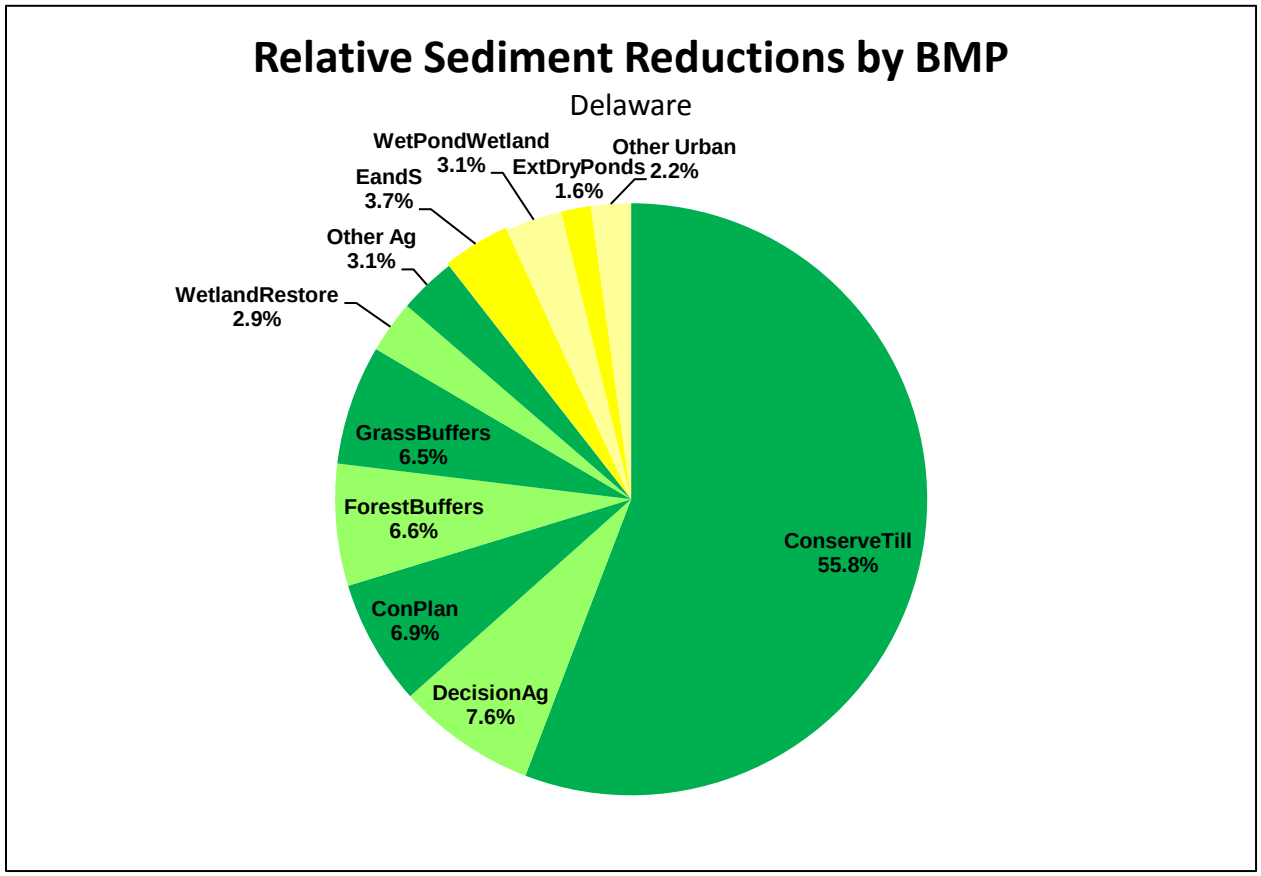
Virginia			
BMP	**Relative Reduction**	**BMP**	**Relative Reduction**
Poultry Phytase	15.5%	Tree Planting	1.1%
Animal Waste Management System	14.0%	Mortality Composters	1.1%
Streamside Grass Buffers	9.2%	Manure Transport	1.0%
Irrigation Water Capture Reuse	6.5%	Other Agriculture	3.7%
Soil Conservation and Water Quality Plans	5.6%	Abandoned Mine Reclamation	2.3%
Stream Access Control with Fencing	5.6%	Urban Infiltration Practices	1.8%
Conservation Tillage	5.1%	Wet Ponds and Wetlands	1.8%
Grass Buffers	4.5%	Erosion and Sediment Control	1.3%
Forest Buffers	3.6%	Urban Nutrient Management	1.3%
Prescribed Grazing	2.8%	Urban Filtering Practices	1.3%
Dairy Precision Feeding	2.3%	Other Urban	2.9%
No Till (stackable)	1.8%	Forest Practices	0.4%
Virginia Decision Agriculture	1.8%	Wastewater + CSO	0.0%
Barnyard Runoff Control	1.6%		



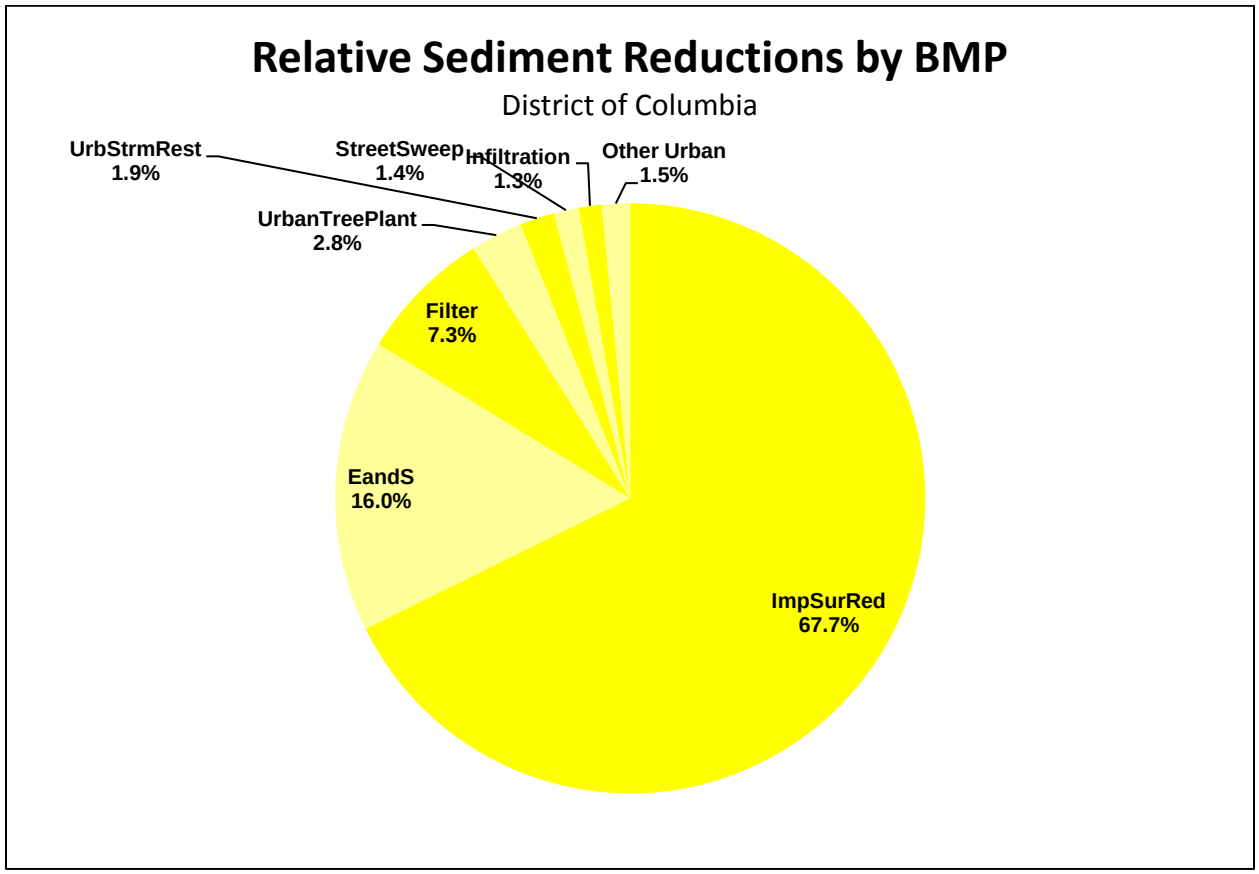
West Virginia	
BMP	**Relative Reduction**
Animal Waste Management System	22.3%
Stream Access Control with Fencing	19.5%
Poultry Phytase	14.1%
Prescribed Grazing	3.6%
Soil Conservation and Water Quality Plans	3.4%
Mortality Composters	1.8%
Conservation Tillage	1.1%
Other Agriculture	3.2%
Interim Erosion and Sediment Control	13.0%
Abandoned Mine Reclamation	4.2%
Forest Harvesting Practices	1.1%
Wastewater + CSO	12.7%



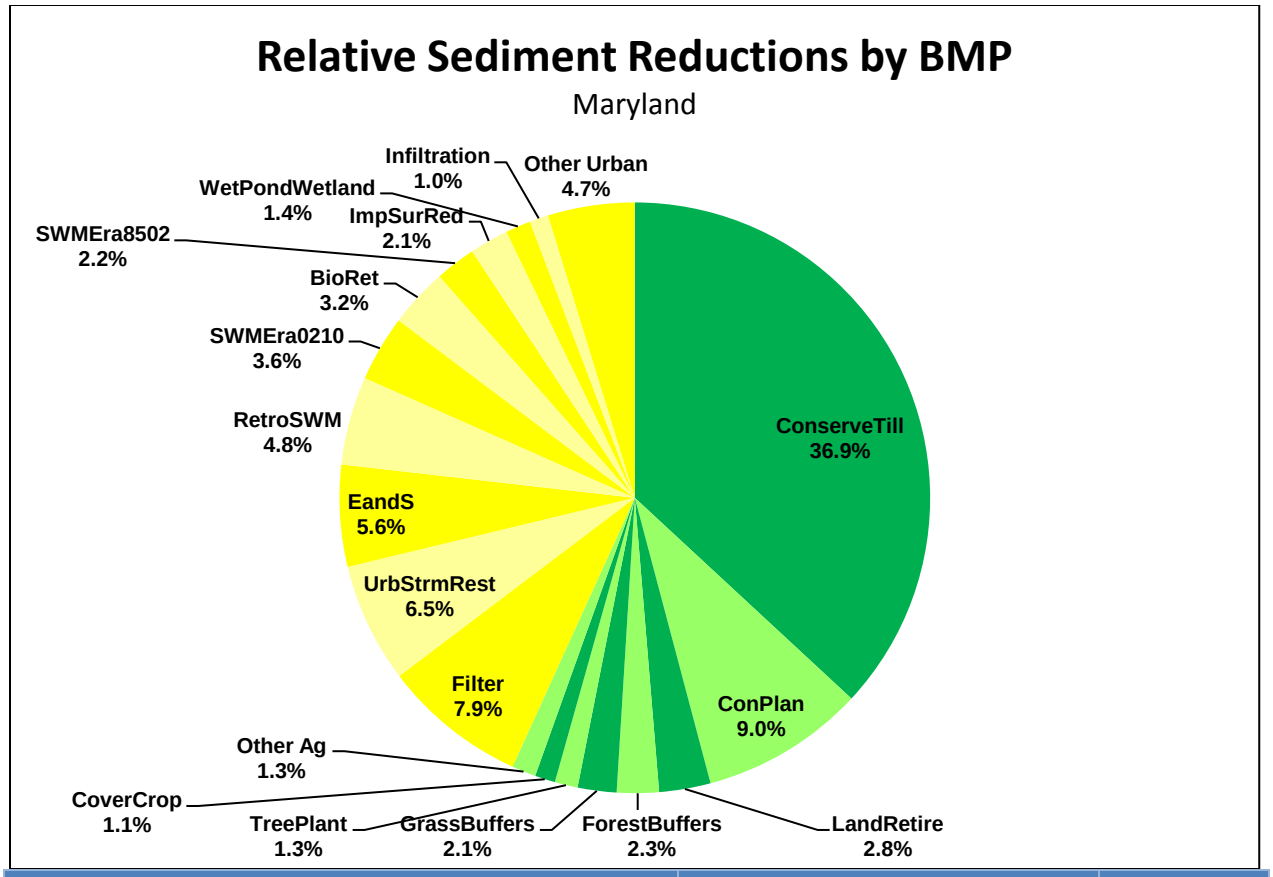
Chesapeake Bay Watershed			
BMP	**Relative Reduction**	**BMP**	**Relative Reduction**
Conservation Tillage	24.6%	Other Agriculture	4.2%
Soil Conservation and Water Quality Plans	7.8%	Urban Filtering Practices	5.2%
Stream Access Control with Fencing	6.8%	Urban Infiltration Practices	3.3%
Streamside Grass Buffers	6.6%	Erosion and Sediment Control	2.1%
Land Retirement	6.5%	Abandoned Mine Reclamation	2.1%
Forest Buffers	5.9%	Urban Stream Restoration	1.8%
Grass Buffers	3.5%	Wet Ponds and Wetlands	1.5%
Prescribed Grazing	3.2%	Erosion and Sediment Control on Extractive	1.3%
Tree Planting	2.3%	Interim Erosion and Sediment Control	1.0%
Non Urban Stream Restoration	1.4%	Other Urban	5.6%
Alternative Crops	1.3%	Forest Practices	0.8%
Wetland Restoration	1.1%	Wastewater + CSO	0.0%



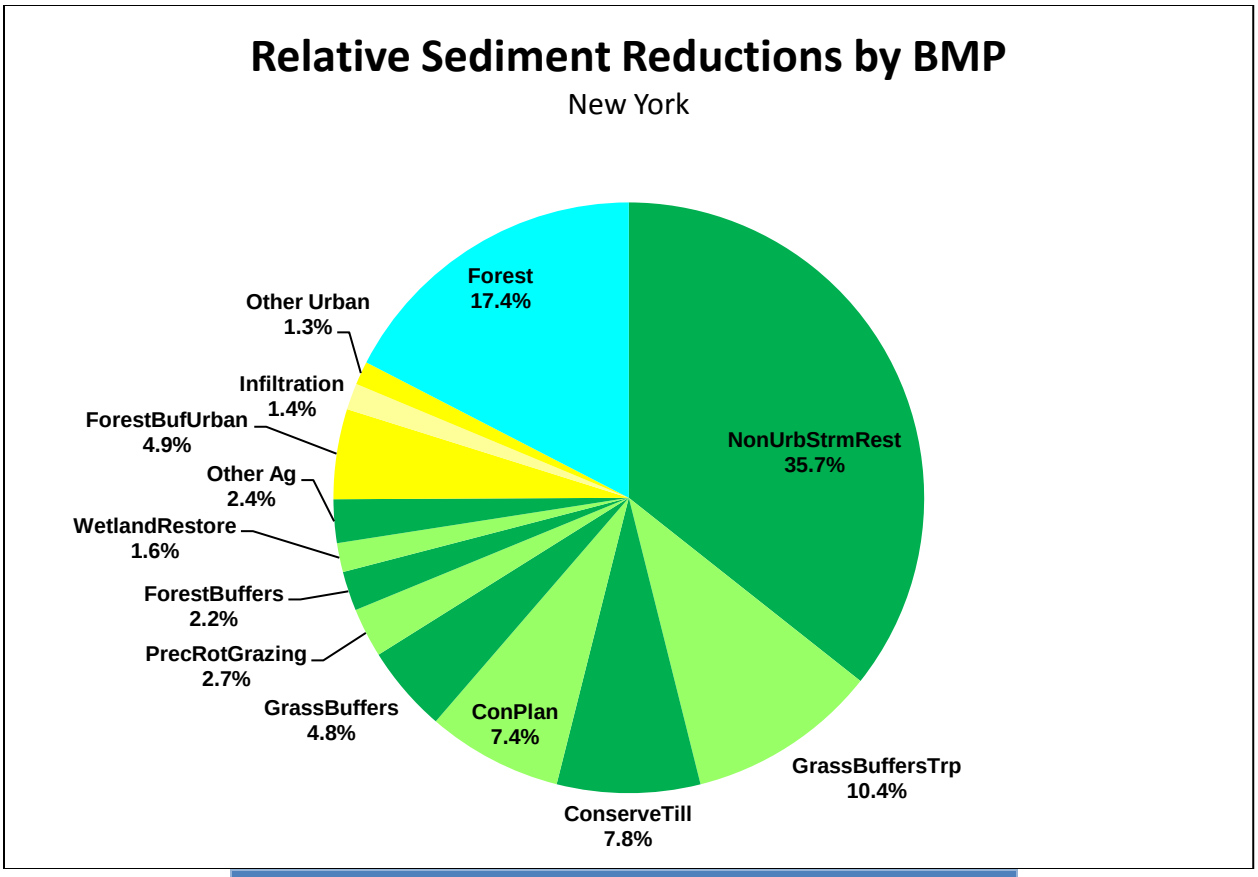
Delaware	
BMP	**Relative Reduction**
Conservation Tillage	55.5%
Decision Agriculture	7.6%
Soil Conservation & Water Quality Plans	6.8%
Forest Buffers	6.6%
Grass Buffers	6.5%
Wetland Restoration	2.9%
Other Agriculture	3.1%
Erosion and Sediment Control	3.7%
Wet Ponds and Wetlands	3.0%
Dry Extended Detention Ponds	1.6%
Other Urban	2.2%
Forest Practices	0.5%
Wastewater + CSO	0.0%



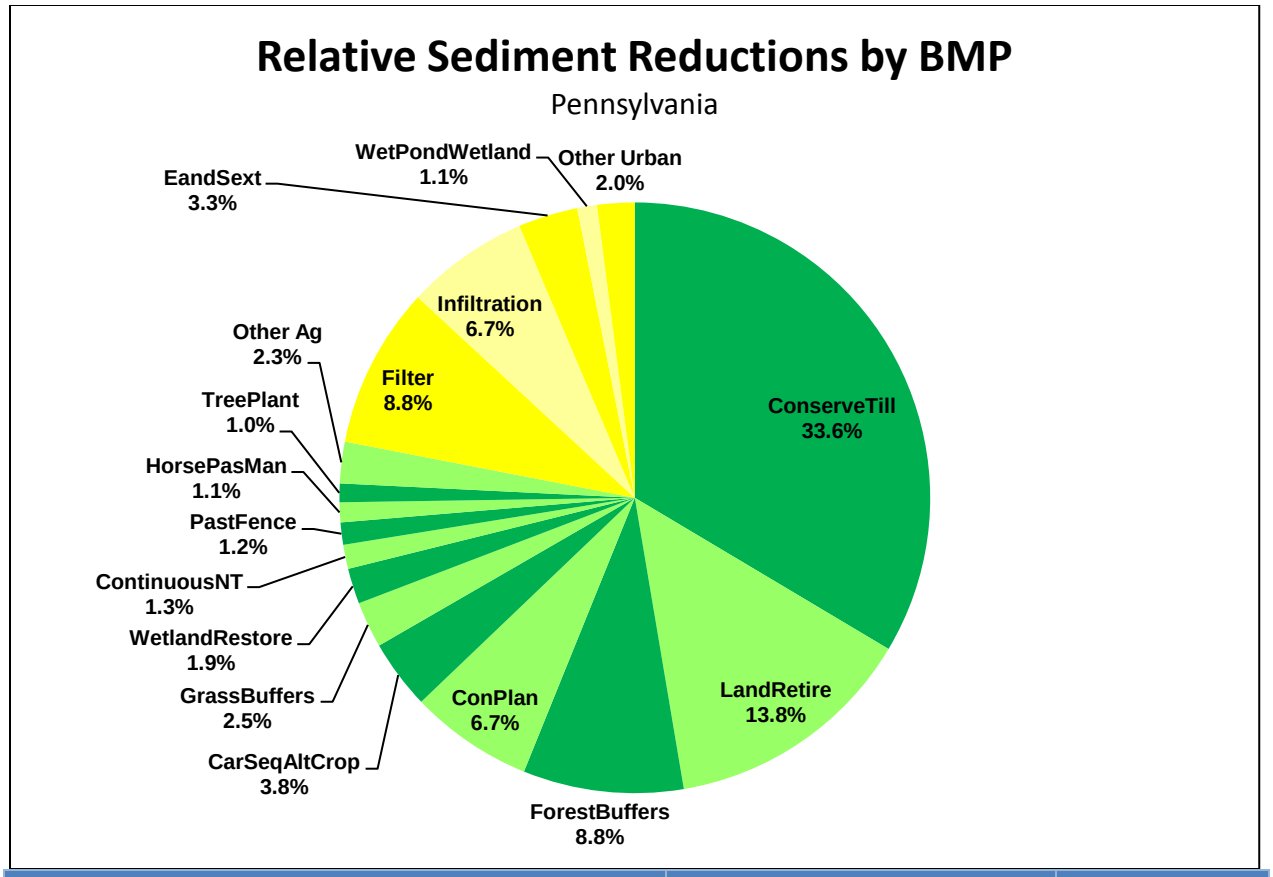
District of Columbia	
BMP	**Relative Reduction**
Impervious Urban Surface Reduction	67.7%
Erosion and Sediment Control	16.0%
Urban Filtering Practices	7.3%
Urban Tree Planting; Urban Tree Canopy	2.8%
Urban Stream Restoration	1.9%
Street Sweeping	1.4%
Urban Infiltration Practices	1.3%
Other Urban	1.5%
Forest Practices	0.0%
Wastewater + CSO	0.0%



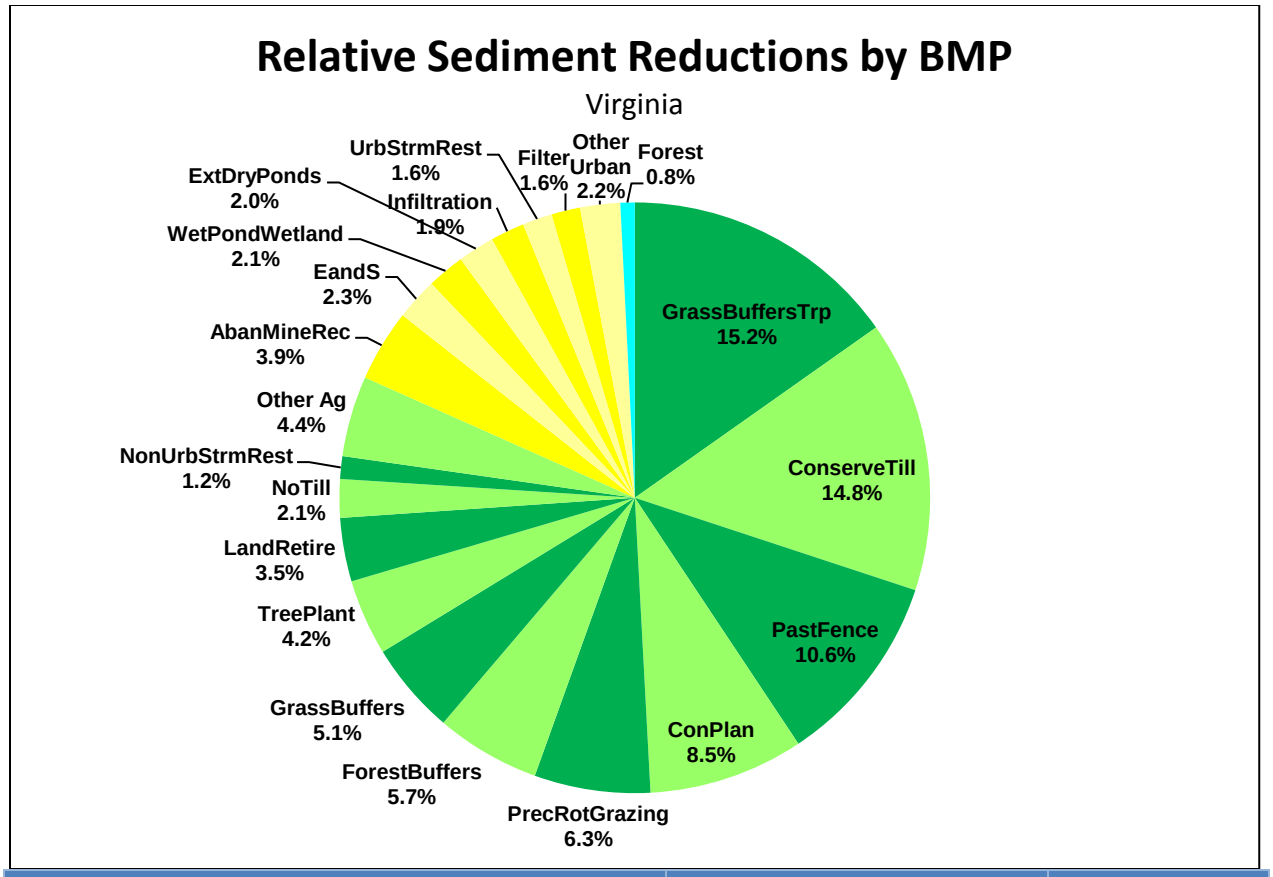
Maryland			
BMP	**Relative Reduction**	**BMP**	**Relative Reduction**
Conservation Tillage	36.9%	Stormwater Management (2002 to 2010), MD	3.6%
Soil Conservation and Water Quality Plans	9.0%	Bioretention/raingardens	3.2%
Land Retirement	2.8%	Stormwater Management (1985 to 2002), MD	2.2%
Forest Buffers	2.3%	Impervious Urban Surface Reduction	2.1%
Grass Buffers	2.1%	Wet Ponds and Wetlands	1.4%
Tree Planting	1.3%	Urban Infiltration Practices	1.0%
Early Cover Crops	1.1%	Other Urban	4.7%
Other Agriculture	1.3%	Forest Practices	0.0%
Urban Filtering Practices	7.9%	Wastewater + CSO	0.0%
Urban Stream Restoration	6.5%		
Erosion and Sediment Control	5.6%		
MS4 Permit-Required Stormwater Retrofit	4.8%		



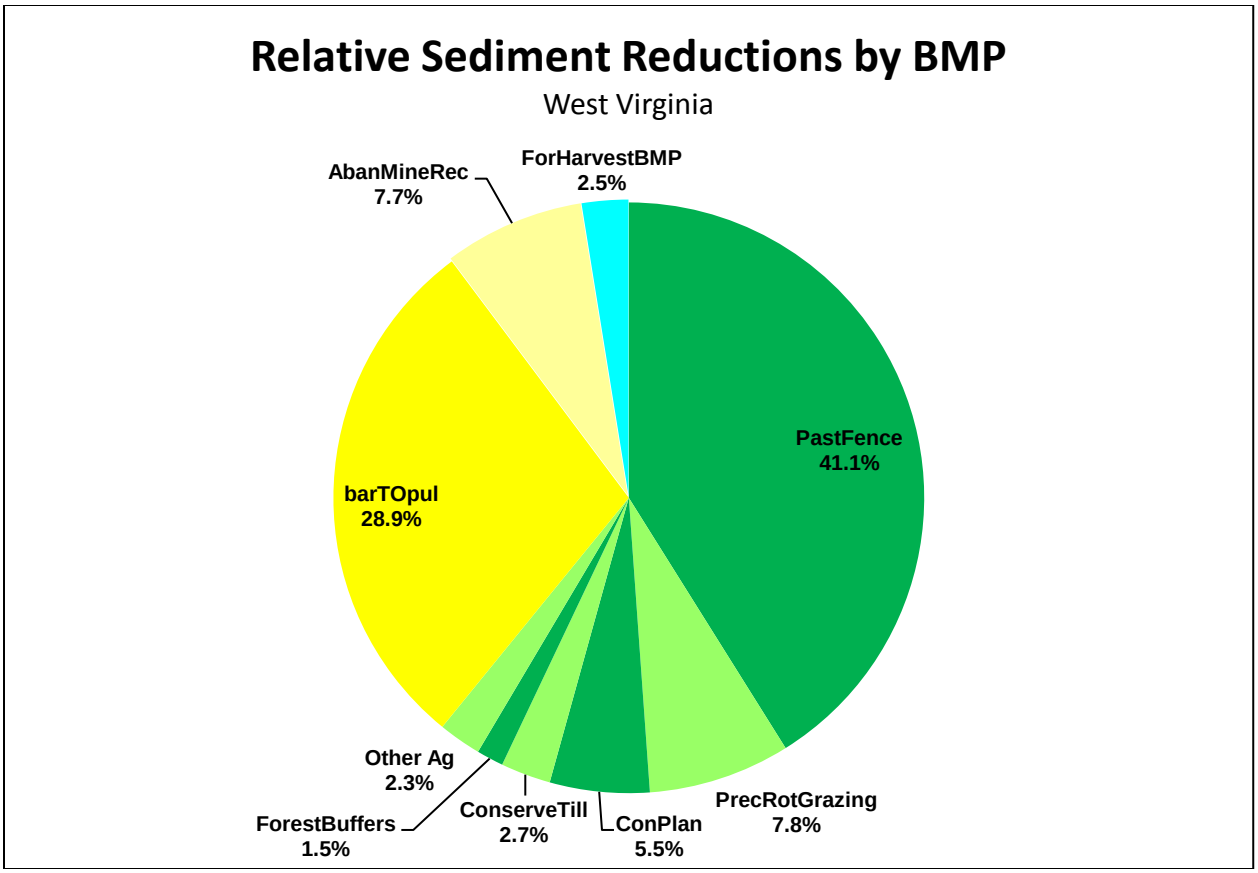
New York	
BMP	**Relative Reduction**
Non Urban Stream Restoration	35.7%
Streamside Grass Buffers	10.4%
Conservation Tillage	7.8%
Soil Conservation & Water Quality Plans	7.4%
Grass Buffers	4.8%
Prescribed Grazing	2.7%
Forest Buffers	2.2%
Wetland Restoration	1.6%
Other Agriculture	2.4%
Urban Forest Buffers	4.9%
Urban Infiltration Practices	1.4%
Other Urban	1.3%
Forest Practices	17.4%
Wastewater + CSO	0.0%



Pennsylvania			
BMP	**Relative Reduction**	**BMP**	**Relative Reduction**
Conservation Tillage	33.6%	Urban Infiltration Practices	6.7%
Land Retirement	13.8%	Erosion and Sediment Control on Extractive	3.3%
Forest Buffers	8.8%	Wet Ponds and Wetlands	1.1%
Soil Conservation and Water Quality Plans	6.7%	Other Urban	2.0%
Alternative Crops	3.8%	Forest Practices	0.0%
Grass Buffers	2.5%	Wastewater + CSO	0.0%
Wetland Restoration	1.9%		
Continuous No Till	1.3%		
Stream Access Control with Fencing	1.2%		
Horse Pasture Management	1.1%		
Tree Planting	1.0%		
Other Agriculture	2.3%		
Urban Filtering Practices	8.8%		



Virginia			
BMP	**Relative Reduction**	**BMP**	**Relative Reduction**
Streamside Grass Buffers	15.2%	Erosion and Sediment Control	2.3%
Conservation Tillage	14.8%	Wet Ponds and Wetlands	2.1%
Stream Access Control with Fencing	10.6%	Dry Extended Detention Ponds	2.0%
Soil Conservation and Water Quality Plans	8.5%	Urban Infiltration Practices	1.9%
Prescribed Grazing	6.3%	Urban Stream Restoration	1.6%
Forest Buffers	5.7%	Urban Filtering Practices	1.6%
Grass Buffers	5.1%	Other Urban	2.2%
Tree Planting	4.2%	Forest Practices	0.8%
Land Retirement	3.5%	Wastewater + CSO	0.0%
No Till (stackable)	2.1%		
Non Urban Stream Restoration	1.2%		
Other Agriculture	4.4%		
Abandoned Mine Reclamation	3.9%		



West Virginia	
BMP	**Relative Reduction**
Stream Access Control with Fencing	41.1%
Prescribed Grazing	7.8%
Soil Conservation and Water Quality Plans	5.5%
Conservation Tillage	2.7%
Forest Buffers	1.5%
Other Agriculture	2.3%
Interim Erosion and Sediment Control	28.9%
Abandoned Mine Reclamation	7.7%
Forest Harvesting Practices	2.5%
Wastewater + CSO	0.0%

Guidance for Revising the Jurisdictions' Chesapeake Bay Implementation Grant Quality Assurance Project Plans for Tracking, Verifying, and Reporting Nutrient and Sediment Pollutant Load Reducing Practices, Treatments, and Technologies

8/11/2014

APPENDIX Q

Introduction

Chesapeake Bay Program jurisdictional partners have reported nonpoint source BMP data since the early 2000s using financial assistance provided through EPA grants. BMP data primarily are used to assess progress towards the jurisdictions meeting their Phase II Watershed Implementation Plans and two year milestones. Each jurisdictional grantee is required to have a quality assurance project plan (QAPP) that describes how BMP data are tracked, verified, and reported to the Chesapeake Bay Program Office (CBPO) and how the accuracy of the data is assured.

The jurisdictional Chesapeake Bay Implementation Grant recipients review their QAPPs *annually* as a condition of the grant and revise them to reflect any changes that have occurred since the last approval. Bay Program partners have made significant improvements in recent years related to practices and the procedures and quality controls for gathering, checking, verifying, and reporting their BMP implementation data. The purpose of this guidance is to standardize and communicate quality expectations for revising the jurisdictions' QAPPs both in anticipation of submission of the 2014 progress data, which is the next reporting period beginning July 2014 and ending June 2015, as well as for review by the Bay Program partners' BMP Verification Review Panel and approval by EPA.

All of the seven jurisdictions' QAPPs can better document improvements made for reporting data through the National Environmental Information Exchange Network (NEIEN). Enhanced documentation is also needed for describing each jurisdiction's plans and procedures to verify the implementation and continued function of all practices, treatments, and technologies to be credited for nutrient and sediment pollutant load reductions as specified in Chesapeake Bay Program approved BMP verification guidance documents for agriculture, forestry, urban stormwater, wastewater, streams, and wetlands.

Guidance for Revising Jurisdictions' CBIG Quality Assurance Project Plans

The EPA Quality Assurance Project Plan format is used below to explain the content expected in the jurisdictions' enhanced BMP tracking, verification, and reporting QAPPs. This guidance can be used for both overall QAPPs and the underlying sources sector- and habitat-specific sections.

GROUP A: PROJECT MANAGEMENT

A1: Title and Approval Sheet
A2: Table of Contents
A3: Distribution List

A4: Project/Task Organization

1) Identify all Sources and Providers of Data – Include all organizations that provide BMP data to reporting agency.
    a. For each data provider, give the agency name, contact person, and BMP types provided.
    b. Organize and link to sector-specific QAPP, if applicable.
    c. Indicate the implementation mechanism for each data source, i.e., cost-share, non cost-share, regulatory, permit-issuing, etc.

2) Provide organizational charts for major data providers showing the organizational units and staff positions responsible for data entry, data management, and reporting.
    a. Include staff responsible for QA/QC checks – they should be independent from those responsible for data collection and entry.
    b. Include staff positions responsible for on-site inspections and record reviews.

A5: Problem Definition/Background

1) Summarize by source sector each agency's history and involvement with BMP data compilation and reporting. Cite lead agencies, state cost-share programs, what year the agency began reporting practices to the CBPO via NEIEN exchange, etc.

2) Explain why the data are being reported, for example:
State agencies compile and report BMP data to the CBPO for assessments of progress towards meeting the state's Phase II Watershed Implementation Plan. The data are reported in standardized formats and codes via the NEIEN. The CBPO creates annual progress scenarios using the CBP Watershed Model (WSM) to describe, assess and report the status of the restoration efforts, and anticipated reductions in nitrogen, phosphorus and sediment loadings to Chesapeake Bay and its tidal tributaries.

3) Emphasize the following points:
    a. Changes in management actions include: implementation of a new BMP; maintenance of an existing BMP (not to be reported as a new practice); or renewed practices such as nutrient management plans.
    b. Changes in management actions *do not* include the reporting existing practices in a new year under a new BMP name.
    c. BMPs units will be tracked directly. Units should not be calculated by estimating a percentage of total acres available.

d. Explain how your agency plans to access federal cost-share practice data, i.e., an existing, updated or future 1619 data sharing agreement with the U.S. Department of Agriculture.
e. Include your agency plans to report resource improvement practices.

A6: Project Description

1) Reference and attach the jurisdiction's version of the table found in the Excel file ***NEIEN NPS BMP CBP Data Flow Appendix8.26_01032014***, which lists the state-reported BMP names and associated default Scenario Builder names.
   a. All BMP names and units should be identical to what the jurisdiction uses to track the practice. (The Chesapeake Bay Program may use different names, definitions and units, and will cross-walk the BMP data accordingly.)
   b. Identify any new or changed BMPs anticipated for 2014-15.
   c. Specify the geographic scale at which BMPs are collected (e.g., latitude/ longitude, county, watershed, etc.).
   d. Report BMPs at the most site-specific scale that conforms to legal and programmatic constraints. If data for the same practice are reported at different scales, describe the method and rationale for grouping the practices at a different scale.

2) Reference and commit to assigning the most recent NPS BMPs codes for NEIEN input tables. The most recent version is the *NEIEN Chesapeake Node Codes List - Version 2.11* (Dec. 2013).

3) BMP Definitions

   Provide a name and definition for each BMP reported to the CBPO. Definitions shall include the required criteria or design standards for achieving the intended water quality benefit. Definitions may be organized by source sector, agency or other grouping that will facilitate review of verification programs. For example, West Virginia Department of Environmental Protection uses the well documented format below to define each of their BMPs.

State BMP Name	Grass Buffers
Units	Acres
Definition	Grass plantings between fields and rivers and streams. Linear strips of vegetation along rivers and streams, helping to filter nutrients, sediment, and other pollutants carried in runoff. Min width = 35',

	recommended 100' (SB 8.4.10).
Lifespan	5 years
NRCS practice(s) counted	390 (Riparian Herbaceous Cover), 393 (Filter Strip) and 412 (Grassed Waterway)
Source(s) of data	Aggregated NRCS/FSA data and State cost-share.
Verification Priority	
Procedure used to compile data	SCD staff enter acreages into a table by county
Checks for Accuracy	Cross-checked with FSA reporting sheet to local Conservation Districts for CREP projects

Alternatively, definitions may be incorporated by reference to a BMP manual or an Administrative Code and the reference provided in pdf format or the URL cited. For example, the Virginia Department of Conservation and Recreation's Cost-Share Manual is on the Internet with complete descriptions for each BMP by name.

Selected BMP Names and URL links to definitions:
Long Term Continuous No Till Planting Systems (CCI - CNT)
Stream Exclusion (CCI-SE-1)

Documenting this basic information in this manner will hasten the review process.

A7: Quality Objectives and Criteria

1) Accuracy Objectives (Qualitative)
    a. Compare expected numbers vs. actual counts using prior years' numbers.
    b. Describe potential for high biases to occur, as a result of double counting, inclusion of expired and non-functional BMPs, failure to implement nutrient management plans.
    c. Describe potential for low biases to occur, such as not capturing non cost-share BMPs.

2) Completeness Objectives – Have all the data sets expected from internal and external sources been received?
    a. Data Providers are to submit data to Agency for the reporting period by (DATE).

b. All months of the year are included.
c. For each Data Provider, were the types of BMPs expected actually received?
d. Minimum percentage of new practices that were verified.
e. Minimum percentage of multi-year practices verified.

A8: Training and Certification

Describe the staff positions responsible for on-site inspections and data reviews. Describe their technical expertise, certifications, titles, etc., that qualify a person to be an inspector. Explain the training and certification requirements necessary for:

1) Database Managers
2) NRCS and State Conservation Specialists
3) Stormwater Inspectors
4) Nutrient Management Specialists who write Nutrient Management Plans
5) Forestry Inspectors
6) CAFO Inspectors

If the training requirements are described in Section D, Verification and Validation Methods, please note here and reference where they are documented.

A9: Documentation and Records

1) Describe how each data provider documents and stores information related to an individual BMP, location or facility. State the data providers' policies for access to and retention times for hard copy and electronic records such as applications, design specifications, conservation plans, photographs, inspection forms, reports and approval letters, etc.

2) Provide the jurisdiction's retention time for compiled BMP data sets. Include jurisdiction procedures for backing-up and preventing loss of electronic records.

3) Insert inspection forms and describe the critical information that is documented. If the documentation and records requirements are described in Section D, Verification and Validation Methods, please note here and reference where they are documented.

GROUP B: DATA GENERATION AND ACQUISITION

Note: Sections B1 through B8 are not applicable to the acquisition and reporting of BMP data.

B9: Non-direct Measurements

B10: DATA MANAGEMENT (Tracking and Reporting Procedures)

Describe in this section the details of how BMP data are obtained, imported, and managed into the agency's data management system. Describe computer software, hardware, and back-up systems.

Explain how datasets are obtained from the sources in a given format, how and what data will be entered and verified if obtained in a hard copy format, and how certain security or confidentiality specifications will be incorporated into the state agency's data management system.

1) Include a simplified work-flow diagram showing the data flow for each BMP data source, listed in the QAPP. Be sure to include sources of non cost-share practices. The diagram should show the position responsible for data entry/recording and the position responsible for validating (QA/QC) the data records. Identify any intermediate steps of transfer of data via spreadsheet, linked databases, or other methods, along with the position(s) responsible. This graphic is meant to show the overall data acquisition and management structure with diagrams of all databases whose content is reported through NEIEN.

2) Reporting to NEIEN
    a. Reference/link to NEIEN input tables.
    b. Commit to assigning the most recent NPS BMPs codes for NEIEN input tables. Reference the most recent version, *NEIEN Chesapeake Node Codes List - Version 2.11* (Dec. 2013).

3) Describe how the BMP lifespans are tracked and the method used to either re-verify the BMP or to remove the BMP from the data tracking system once the lifespan has expired.

4) Identify potential sources of double-counting of the same practice and steps taken to eliminate it. Where multiple agencies/organizations fund and report the same BMP, describe coordination mechanisms among agencies/organizations and/or identifiers in the database.

GROUP C: ASSESSMENT AND OVERSIGHT

C1: Assessment and Response Action

1) List the assessments done to ensure that:
    a. The acquired data meet the specifications and are suitable for reporting.
    b. The data were obtained according to the procedures in Section B10.
    c. The data were verified according to procedures in Section D.

    Note: Describe the actual verification and validation procedures in Section D2.

2) Identify which sectors and practices or groups of practices on which the jurisdictions will focus it verification efforts given they account for the greatest nutrient and sediment pollutant load reductions as described in their Phase II Watershed Implementation Plans.

C2: Reports to Management

GROUP D: DATA VALIDATION AND USABILITY

D1: Data Review, Verification and Validation

In this section, describe how the overall BMP verification program achieves the CBP partnership's five BMP verification principles. Summarize the jurisdiction's processes to review, verify and validate management practice information; reference specific CBP approved verification guidance, procedures and processes as appropriate. If the state agency reports BMP data that has been reviewed, verified, and/or validated by another agency/organization, provide references to that agency's/organization's procedures.

Section 4 of the Chesapeake Bay Program partners' *Strengthening Verification of Best Management Practices Implemented in the Chesapeake Bay Watershed: A Basinwide Framework* recommends that each jurisdiction's QAPP cover the following items and activities for each logical group of BMPs:

- Copies of, or specific references (with URL links) to the documentation of existing BMP verification programs in operation and overseen by all partners—e.g., NRCS, FSA, other federal agencies, federal facilities, conservation districts, municipalities, businesses, non-governmental organizations—which are actively verifying practices implemented within the jurisdiction and which will be reported by the jurisdiction for nutrient and sediment pollutant load reduction credit.

- Copies of or specific references (with URL links) to the BMP verification guidance and procedures adopted by the Bay Program partners.

- Jurisdiction-specific modifications to and variations from the Bay Program's adopted BMP verification guidance and procedures.

- Decisions that focus verification programs and protocols on a subset of nutrient and sediment pollutant load reduction practices, treatments, or technologies or geographic areas.

- Document how each set of grouped BMP verification protocols will be implemented by whom, how, and through what programs/mechanisms.

- Describe which sets of grouped BMP verification protocols and procedures are already in place, fully operational, and being routinely carried out.

- Describe which sets of grouped BMP verification protocols and procedures are planned for future implementation, by when, by whom, how, and through what programs/mechanisms.

- Describe further programmatic and organizational changes needed to make the each set of grouped BMP verification protocols and procedures fully operational and routinely carried out.

For the purposes of reporting BMP data, the Chesapeake Bay Program partners have agreed upon the following definitions for data review, verification, and validation:

Data Review – Data reviews should be *independent*, meaning that they are carried out by someone within the same organization having technical expertise in the subject matter to a degree at least equivalent to that needed for the original work, but who was not involved as a participant, supervisor, technical reviewer, or advisor in the development or operations of the program/practice under review. An *external independent review* is done by someone from an outside organization with technical expertise in the subject matter to a degree at least equivalent to that needed for the original work. (CBP 2014)

Verification – BMP verification is: "the process through which agency partners ensure practices, treatments, and technologies resulting in reductions of nitrogen, phosphorus, and/or sediment pollutant loads are implemented and operating correctly." (Review Panel, Nov. 2013).

Data Validation – BMP data validation is defined as a QA/QC check of a data record. The CBP's preferred validation method is a visual field check of an adequate statistical sample. It is

expected that all BMPs, both internal and external, have at least a basic database or paper check of an adequate statistical sample.

D2: Verification and Validation Methods

1) Organization and Summary Tables

The CBP BMP Verification Committee developed expectations for verification programs that will be used to approve the jurisdictions' verification methods. Table 7, *Jurisdiction BMP Verification Protocol Components Checklist*, in the basinwide BMP verification framework report, contains the components that should be addressed for each BMP sector or grouping. If any of these items are not covered in the QAPP, jurisdictions should document an explanation.

Jurisdictions may choose to have sector-specific sections within the QAPP to document the verification and validation procedures for that sector. Within such sector-specific sections of the QAPP, attach a sector-specific checklist (see Table 1 below) to indicate where in the QAPP the various components are documented. Note that components may be described in multiple sections of the QAPP.

Table 1. Mapping of Jurisdiction BMP Verification Protocol Components to the Relevant QAPP Sections.

	Sector:	
	BMP Verification Component	**QAPP Section**
1	**BMP's Collected**	
	Type (structural, management, annual, etc.)	A6: Project Description and Table 8 – Verification Protocol Design
	BMP Funding/Cost shared (federal, state, NGO, non-cost shared)	A6: Project Description and Table 8 – Verification Protocol Design
	Distinct state standards/specifications	A6: Project Description and/or D2: Verification & Validation Methods
	Matching CBP BMP definition/efficiencies	Spreadsheet: *NEIEN NPS BMP CBP Data Flow (Appendix8.26_01032014)*
2	**Method/System of Verification/Assessment**	
	Description of methods/systems to be used	D2: Verification Methods and Table 8 – Verification Protocol Design
	Documentation of procedures used to verify BMP's	D2: Verification & Validation Methods

	Sector:	
	BMP Verification Component	**QAPP Section**
	Instruction manual for system users	D2: Verification & Validation Methods
3	**Who will Complete the Verification**	
	Qualification requirements	A8: Training & Certification and/or D2: Verification & Validation Methods
	Training requirements	
	Certification requirements	
	CEU follow-up training requirements in the future	
4	**Documentation of Verification Finding**	
	Date of installation	A9: Documentation & Records D2: Verification & Validation Methods
	Location (lat/long if applicable)	
	Level of reporting (watershed, HUC, county, site specific, etc.)	
	Units (number, acres, length, etc.) needed for NEIEN	
	Ownership (public, private)	
	Documentation:	A9: Documentation & Records and/or D2: Verification & Validation Methods
	Pictures	
	Worksheets	
	Electronic Tool	
	Aerial Photos	
	Maps	
	Other	
	Report Generator	
5	**How Often Reviewed (Cycle of review)**	
	1-2 years	D2: Verification & Validation Methods and Table 8 – Verification Protocol Design
	5 years	
	10 years	
	Other	
6	**Independent Verification of Finding**	
	Is this a requirement?	D2: Verification & Validation Methods
	Internal Independent	
	External Independent	

	Sector:	
	BMP Verification Component	**QAPP Section**
	BMP Data Validation	
7	**Quality Assurance/Spot Checking**	
	Who-qualifications/training/certification	A8: Training & Certification D2: Verification & Validation Methods
	Method to select BMP for follow-up check	
	Method to select the number of BMPs to review	
	Other	
8	**Data Entry of BMP Implementation**	
	What is the system?	B10: Data Management (Tracking & Reporting Procedures)
	Who enters data (training/certification)?	
	Does the system connect to NEIEN?	
	System in place prevent double counting	
9	**External Provided Data Validation Meeting CBP Partnership Guidance**	
	Method to validate data	D2: Verification & Validation Methods
	Who will validate data (training/certification)?	
10	**Historic Data Verification**	
	System to re-certify or remove	
	Who will verify historic data training/certification)?	
	Documentation of action	
	BMP Performance	
11	Does state collect data to assess BMP Performance?	
	System used to collect BMP performance data?	
	Who collects BMP performance data?	
	Who analyses collected data and report to CBP?	

Source: Derived from Table 7 in CBP 2014.

2) Data Validation Methods

For the purposes of reporting BMP data, validation is defined as a QA/QC check of a data record. It is preferred that validation reviews are independent and that validation methods are based on a visual field check of an adequate statistical sample. The minimum procedure is to conduct a basic database or paper check of an adequate

statistical sample. In this section of the QAPP, the jurisdictions need to address:

a. Expired BMPs - Describe how records are selected and then checked to ensure that expired BMPs are either re-verified and submitted to NEIEN or considered beyond their lifespan and not be submitted to NEIEN.

b. Double Counting - Describe which records are selected then checked to ensure that double-counting has not occurred.

c. Describe how data from external data providers are evaluated or checked for accuracy.

d. For each of the checks above, cite the position responsible, training, and certification.

Describe or reference the procedures used by an external independent reviewers to validate BMP data. The preferred approach for external reviewers is to compare the data to a known database and to assess the data collection procedures. The minimum, basic expectation is a database or paper check of an adequate statistical sample. In the case of NRCS and FSA data, having a current data sharing agreement that meets Section 1619 requirements will help ensure accurate validation.

3) Data Verification

Verification methods should to consistent with the sector-specific guidance documents for verifying agricultural, forestry, storm water, wastewater treatment, stream and wetland best management practices or the jurisdictions will need to provide documentation justify taking alternative approaches which still achieve the Bay Program partners BMP verification principles.

References Cited

CBP (Chesapeake Bay Program). 2014. *Strengthening Verification of Best Management Practices Implemented in the Chesapeake Bay Watershed: A Basinwide Framework.* Annapolis, MD.

Federal Register

Friday,
May 15, 2009

Part IV

The President

Executive Order 13508—Chesapeake Bay Protection and Restoration

APPENDIX R. Executive Order 13508

Federal Register
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Presidential Documents

Title 3—

The President

Executive Order 13508 of May 12, 2009

Chesapeake Bay Protection and Restoration

By the authority vested in me as President by the Constitution and the laws of the United States of America and in furtherance of the purposes of the Clean Water Act of 1972, as amended (33 U.S.C. 1251 *et seq.*), and other laws, and to protect and restore the health, heritage, natural resources, and social and economic value of the Nation's largest estuarine ecosystem and the natural sustainability of its watershed, it is hereby ordered as follows:

PART 1—PREAMBLE

The Chesapeake Bay is a national treasure constituting the largest estuary in the United States and one of the largest and most biologically productive estuaries in the world. The Federal Government has nationally significant assets in the Chesapeake Bay and its watershed in the form of public lands, facilities, military installations, parks, forests, wildlife refuges, monuments, and museums.

Despite significant efforts by Federal, State, and local governments and other interested parties, water pollution in the Chesapeake Bay prevents the attainment of existing State water quality standards and the ''fishable and swimmable'' goals of the Clean Water Act. At the current level and scope of pollution control within the Chesapeake Bay's watershed, restoration of the Chesapeake Bay is not expected for many years. The pollutants that are largely responsible for pollution of the Chesapeake Bay are nutrients, in the form of nitrogen and phosphorus, and sediment. These pollutants come from many sources, including sewage treatment plants, city streets, development sites, agricultural operations, and deposition from the air onto the waters of the Chesapeake Bay and the lands of the watershed.

Restoration of the health of the Chesapeake Bay will require a renewed commitment to controlling pollution from all sources as well as protecting and restoring habitat and living resources, conserving lands, and improving management of natural resources, all of which contribute to improved water quality and ecosystem health. The Federal Government should lead this effort. Executive departments and agencies (agencies), working in collaboration, can use their expertise and resources to contribute significantly to improving the health of the Chesapeake Bay. Progress in restoring the Chesapeake Bay also will depend on the support of State and local governments, the enterprise of the private sector, and the stewardship provided to the Chesapeake Bay by all the people who make this region their home.

PART 2—SHARED FEDERAL LEADERSHIP, PLANNING, AND ACCOUNTABILITY

Sec. 201. *Federal Leadership Committee.* In order to begin a new era of shared Federal leadership with respect to the protection and restoration of the Chesapeake Bay, a Federal Leadership Committee (Committee) for the Chesapeake Bay is established to oversee the development and coordination of programs and activities, including data management and reporting, of agencies participating in protection and restoration of the Chesapeake Bay. The Committee shall manage the development of strategies and program plans for the watershed and ecosystem of the Chesapeake Bay and oversee their implementation. The Committee shall be chaired by the Administrator of the Environmental Protection Agency (EPA), or the Administrator's designee, and include senior representatives of the Departments of Agriculture

(USDA), Commerce (DOC), Defense (DOD), Homeland Security (DHS), the Interior (DOI), Transportation (DOT), and such other agencies as determined by the Committee. Representatives serving on the Committee shall be officers of the United States.

Sec. 202. *Reports on Key Challenges to Protecting and Restoring the Chesapeake Bay.* Within 120 days from the date of this order, the agencies identified in this section as the lead agencies shall prepare and submit draft reports to the Committee making recommendations for accomplishing the following steps to protect and restore the Chesapeake Bay:

(a) define the next generation of tools and actions to restore water quality in the Chesapeake Bay and describe the changes to be made to regulations, programs, and policies to implement these actions;

(b) target resources to better protect the Chesapeake Bay and its tributary waters, including resources under the Food Security Act of 1985 as amended, the Clean Water Act, and other laws;

(c) strengthen storm water management practices at Federal facilities and on Federal lands within the Chesapeake Bay watershed and develop storm water best practices guidance;

(d) assess the impacts of a changing climate on the Chesapeake Bay and develop a strategy for adapting natural resource programs and public infrastructure to the impacts of a changing climate on water quality and living resources of the Chesapeake Bay watershed;

(e) expand public access to waters and open spaces of the Chesapeake Bay and its tributaries from Federal lands and conserve landscapes and ecosystems of the Chesapeake Bay watershed;

(f) strengthen scientific support for decisionmaking to restore the Chesapeake Bay and its watershed, including expanded environmental research and monitoring and observing systems; and

(g) develop focused and coordinated habitat and research activities that protect and restore living resources and water quality of the Chesapeake Bay and its watershed.

The EPA shall be the lead agency for subsection (a) of this section and the development of the storm water best practices guide under subsection (c). The USDA shall be the lead agency for subsection (b). The DOD shall lead on storm water management practices at Federal facilities and on Federal lands under subsection (c). The DOI and the DOC shall share the lead on subsections (d), (f), and (g), and the DOI shall be lead on subsection (e). The lead agencies shall provide final reports to the Committee within 180 days of the date of this order.

Sec. 203. *Strategy for Protecting and Restoring the Chesapeake Bay.* The Committee shall prepare and publish a strategy for coordinated implementation of existing programs and projects to guide efforts to protect and restore the Chesapeake Bay. The strategy shall, to the extent permitted by law:

(a) define environmental goals for the Chesapeake Bay and describe milestones for making progress toward attainment of these goals;

(b) identify key measureable indicators of environmental condition and changes that are critical to effective Federal leadership;

(c) describe the specific programs and strategies to be implemented, including the programs and strategies described in draft reports developed under section 202 of this order;

(d) identify the mechanisms that will assure that governmental and other activities, including data collection and distribution, are coordinated and effective, relying on existing mechanisms where appropriate; and

(e) describe a process for the implementation of adaptive management principles, including a periodic evaluation of protection and restoration activities.

The Committee shall review the draft reports submitted by lead agencies under section 202 of this order and, in consultation with relevant State agencies, suggest appropriate revisions to the agency that provided the draft report. It shall then integrate these reports into a coordinated strategy for restoration and protection of the Chesapeake Bay consistent with the requirements of this order. Together with the final reports prepared by the lead agencies, the draft strategy shall be published for public review and comment within 180 days of the date of this order and a final strategy shall be published within 1 year. To the extent practicable and authorized under their existing authorities, agencies may begin implementing core elements of restoration and protection programs and strategies, in consultation with the Committee, as soon as possible and prior to release of a final strategy.

Sec. 204. *Collaboration with State Partners.* In preparing the reports under section 202 and the strategy under section 203, the lead agencies and the Committee shall consult extensively with the States of Virginia, Maryland, Pennsylvania, West Virginia, New York, and Delaware and the District of Columbia. The goal of this consultation is to ensure that Federal actions to protect and restore the Chesapeake Bay are closely coordinated with actions by State and local agencies in the watershed and that the resources, authorities, and expertise of Federal, State, and local agencies are used as efficiently as possible for the benefit of the Chesapeake Bay's water quality and ecosystem and habitat health and viability.

Sec. 205. *Annual Action Plan and Progress Report.* Beginning in 2010, the Committee shall publish an annual Chesapeake Bay Action Plan (Action Plan) describing how Federal funding proposed in the President's Budget will be used to protect and restore the Chesapeake Bay during the upcoming fiscal year. This plan will be accompanied by an Annual Progress Report reviewing indicators of environmental conditions in the Chesapeake Bay, assessing implementation of the Action Plan during the preceding fiscal year, and recommending steps to improve progress in restoring and protecting the Chesapeake Bay. The Committee shall consult with stakeholders (including relevant State agencies) and members of the public in developing the Action Plan and Annual Progress Report.

Sec. 206. *Strengthen Accountability.* The Committee, in collaboration with State agencies, shall ensure that an independent evaluator periodically reports to the Committee on progress toward meeting the goals of this order. The Committee shall ensure that all program evaluation reports, including data on practice or system implementation and maintenance funded through agency programs, as appropriate, are made available to the public by posting on a website maintained by the Chair of the Committee.

PART 3—RESTORE CHESAPEAKE BAY WATER QUALITY

Sec. 301. *Water Pollution Control Strategies.* In preparing the report required by subsection 202(a) of this order, the Administrator of the EPA (Administrator) shall, after consulting with appropriate State agencies, examine how to make full use of its authorities under the Clean Water Act to protect and restore the Chesapeake Bay and its tributary waters and, as appropriate, shall consider revising any guidance and regulations. The Administrator shall identify pollution control strategies and actions authorized by the EPA's existing authorities to restore the Chesapeake Bay that:

(a) establish a clear path to meeting, as expeditiously as practicable, water quality and environmental restoration goals for the Chesapeake Bay;

(b) are based on sound science and reflect adaptive management principles;

(c) are performance oriented and publicly accountable;

(d) apply innovative and cost-effective pollution control measures;

(e) can be replicated in efforts to protect other bodies of water, where appropriate; and

(f) build on the strengths and expertise of Federal, State, and local governments, the private sector, and citizen organizations.

Sec. 302. *Elements of EPA Reports.* The strategies and actions identified by the Administrator of the EPA in preparing the report under subsection 202(a) shall include, to the extent permitted by law:

(a) using Clean Water Act tools, including strengthening existing permit programs and extending coverage where appropriate;

(b) establishing new, minimum standards of performance where appropriate, including:

(i) establishing a schedule for the implementation of key actions in cooperation with States, local governments, and others;

(ii) constructing watershed-based frameworks that assign pollution reduction responsibilities to pollution sources and maximize the reliability and cost-effectiveness of pollution reduction programs; and

(iii) implementing a compliance and enforcement strategy.

PART 4—AGRICULTURAL PRACTICES TO PROTECT THE CHESAPEAKE BAY

Sec. 401. In developing recommendations for focusing resources to protect the Chesapeake Bay in the report required by subsection 202(b) of this order, the Secretary of Agriculture shall, as appropriate, concentrate the USDA's working lands and land retirement programs within priority watersheds in counties in the Chesapeake Bay watershed. These programs should apply priority conservation practices that most efficiently reduce nutrient and sediment loads to the Chesapeake Bay, as identified by USDA and EPA data and scientific analysis. The Secretary of Agriculture shall work with State agriculture and conservation agencies in developing the report.

PART 5—REDUCE WATER POLLUTION FROM FEDERAL LANDS AND FACILITIES

Sec. 501. Agencies with land, facilities, or installation management responsibilities affecting ten or more acres within the watershed of the Chesapeake Bay shall, as expeditiously as practicable and to the extent permitted by law, implement land management practices to protect the Chesapeake Bay and its tributary waters consistent with the report required by section 202 of this order and as described in guidance published by the EPA under section 502.

Sec. 502. The Administrator of the EPA shall, within 1 year of the date of this order and after consulting with the Committee and providing for public review and comment, publish guidance for Federal land management in the Chesapeake Bay watershed describing proven, cost-effective tools and practices that reduce water pollution, including practices that are available for use by Federal agencies.

PART 6—PROTECT CHESAPEAKE BAY AS THE CLIMATE CHANGES

Sec. 601. The Secretaries of Commerce and the Interior shall, to the extent permitted by law, organize and conduct research and scientific assessments to support development of the strategy to adapt to climate change impacts on the Chesapeake Bay watershed as required in section 202 of this order and to evaluate the impacts of climate change on the Chesapeake Bay in future years. Such research should include assessment of:

(a) the impact of sea level rise on the aquatic ecosystem of the Chesapeake Bay, including nutrient and sediment load contributions from stream banks and shorelines;

(b) the impacts of increasing temperature, acidity, and salinity levels of waters in the Chesapeake Bay;

(c) the impacts of changing rainfall levels and changes in rainfall intensity on water quality and aquatic life;

(d) potential impacts of climate change on fish, wildlife, and their habitats in the Chesapeake Bay and its watershed; and

(e) potential impacts of more severe storms on Chesapeake Bay resources.

PART 7—EXPAND PUBLIC ACCESS TO THE CHESAPEAKE BAY AND CONSERVE LANDSCAPES AND ECOSYSTEMS

Sec. 701. (a) Agencies participating in the Committee shall assist the Secretary of the Interior in development of the report addressing expanded public access to the waters of the Chesapeake Bay and conservation of landscapes and ecosystems required in subsection 202(e) of this order by providing to the Secretary:

(i) a list and description of existing sites on agency lands and facilities where public access to the Chesapeake Bay or its tributary waters is offered;

(ii) a description of options for expanding public access at these agency sites;

(iii) a description of agency sites where new opportunities for public access might be provided;

(iv) a description of safety and national security issues related to expanded public access to Department of Defense installations;

(v) a description of landscapes and ecosystems in the Chesapeake Bay watershed that merit recognition for their historical, cultural, ecological, or scientific values; and

(vi) options for conserving these landscapes and ecosystems.

(b) In developing the report addressing expanded public access on agency lands to the waters of the Chesapeake Bay and options for conserving landscapes and ecosystems in the Chesapeake Bay, as required in subsection 202(e) of this order, the Secretary of the Interior shall coordinate any recommendations with State and local agencies in the watershed and programs such as the Captain John Smith Chesapeake National Historic Trail, the Chesapeake Bay Gateways and Watertrails Network, and the Star-Spangled Banner National Historic Trail.

PART 8—MONITORING AND DECISION SUPPORT FOR ECOSYSTEM MANAGEMENT

Sec. 801. The Secretaries of Commerce and the Interior shall, to the extent permitted by law, organize and conduct their monitoring, research, and scientific assessments to support decisionmaking for the Chesapeake Bay ecosystem and to develop the report addressing strengthening environmental monitoring of the Chesapeake Bay and its watershed required in section 202 of this order. This report will assess existing monitoring programs and gaps in data collection, and shall also include the following topics:

(a) the health of fish and wildlife in the Chesapeake Bay watershed;

(b) factors affecting changes in water quality and habitat conditions; and

(c) using adaptive management to plan, monitor, evaluate, and adjust environmental management actions.

PART 9—LIVING RESOURCES PROTECTION AND RESTORATION

Sec. 901. The Secretaries of Commerce and the Interior shall, to the extent permitted by law, identify and prioritize critical living resources of the Chesapeake Bay and its watershed, conduct collaborative research and habitat protection activities that address expected outcomes for these species, and develop a report addressing these topics as required in section 202 of this order. The Secretaries of Commerce and the Interior shall coordinate agency activities related to living resources in estuarine waters to ensure maximum benefit to the Chesapeake Bay resources.

PART 10—EXCEPTIONS

Sec. 1001. The heads of agencies may authorize exceptions to this order, in the following circumstances:

(a) during time of war or national emergency;

(b) when necessary for reasons of national security;

(c) during emergencies posing an unacceptable threat to human health or safety or to the marine environment and admitting of no other feasible solution; or

(d) in any case that constitutes a danger to human life or a real threat to vessels, aircraft, platforms, or other man-made structures at sea, such as cases of *force majeure* caused by stress of weather or other act of God.

PART 11—GENERAL PROVISIONS

Sec. 1101. (a) Nothing in this order shall be construed to impair or otherwise affect:

(i) authority granted by law to a department, agency, or the head thereof; or

(ii) functions of the Director of the Office of Management and Budget relating to budgetary, administrative, or legislative proposals.

(b) This order shall be implemented consistent with applicable law and subject to the availability of appropriations.

(c) This order is not intended to, and does not, create any right or benefit, substantive or procedural, enforceable at law or in equity, by any party against the United States, its departments, agencies, or entities, its officers, employees, or agents, or any other person.

THE WHITE HOUSE,
May 12, 2009.

[FR Doc. E9–11547
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Billing code 3195–W9–P

Appendix S

2

Tracking and Accounting

The term "tracking," as applied in the Chesapeake Bay Program (CBP), describes approaches to document the implementation of nutrient and sediment reduction practices and treatment technology upgrades and the basic associated practice characteristics needed to estimate resulting changes in nutrient and sediment loads. The term "accounting" describes the process of analyzing and reporting the practice information and quantifying the estimated load reductions. Reliable tracking and accounting of point and nonpoint nutrient reduction efforts are essential for program managers and policy makers to determine if current strategies are sufficient or if new strategies are necessary to meet established milestones. In addition, accurate and transparent tracking and accounting are key to maintaining public confidence that funds for Bay restoration are being wisely invested and that CBP partners are fulfilling their commitments to reduce nutrient and sediment loads.

By examining the strengths and weaknesses of current jurisdictional tracking and accounting practices, the committee provides insights into their reliability, accuracy, and consistency. In this chapter, the committee reviews and critiques the tracking and accounting practices for nutrient and sediment reduction efforts in the Chesapeake Bay.

TRACKING AND ACCOUNTING FRAMEWORKS

Diverse activities have been implemented within the Bay watershed to reduce nutrient and sediment loads, and many more are planned for the years ahead. The six states and the District of Columbia (i.e., the Bay

jurisdictions) have developed separate and distinct strategies within their regulatory and nonregulatory programs to identify, quantify, and attempt to control point and nonpoint sources of nutrients. In addition, state and federal agencies fund wastewater infrastructure improvements through the federal Clean Water Act State Revolving Funds and other programs designed to improve land management and reduce nutrient and sediment pollution. Finally, there are voluntary efforts that are not cost-shared by any particular state or federal agency. Ideally, tracking and accounting in the Bay watershed would account for all of these activities consistently and accurately, without duplication, and in a centralized framework.

The Bay jurisdictions bear the primary responsibility for tracking nutrient and sediment control efforts and reporting them to the CBP. Through a variety of state and local agencies, each jurisdiction compiles information about the nutrient and sediment control practices implemented in the Bay watershed to address point and nonpoint sources of pollution. The CBP has approved more than 60 agricultural and urban best management practices (BMPs) for credit in the Chesapeake Bay Watershed Model (see Appendix B) and has used a peer-review process to assign pollutant load-reduction effectiveness estimates to each BMP.

Any practice approved by the CBP and implemented since 1985 is included in the tracking and accounting of nutrient and sediment reduction strategies. In 1987, the CBP partners agreed to specific goals for pollution control (see Chapter 1), including a goal to reduce nitrogen and phosphorus discharges by 40 percent below 1985 levels by the year 2000. All nutrient reduction that has taken place since 1985 is, therefore, credited toward the achievement of those CBP goals and tracked in the Watershed Model.

All of the Bay jurisdictions report annually to the U.S. Environmental Protection Agency (EPA) data concerning compliance with National Pollutant Discharge Elimination System (NPDES) permits associated with point-source discharges, including for entities such as wastewater treatment plants and urban and suburban Municipal Separate Storm Sewer Systems (MS4s). All Bay jurisdictions have been delegated authority from the EPA to implement the NPDES program and, therefore, assume that regulatory responsibility. As part of that responsibility, the Bay jurisdictions check the quality and completeness of permit compliance and monitoring data in accordance with EPA-approved quality assurance plans and programmatic requirements before submitting the data to the CBP for incorporation into the Chesapeake Bay Model and tracking and accounting systems. Data from NPDES compliance monitoring are used in the tracking and accounting of significant wastewater treatment facilities. However, water quality monitoring is largely not part of the tracking and accounting process for nonpoint-source pollution control measures.

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National permitting programs do not exist for nonpoint sources of pollution, which include general agricultural and forestry land uses, stormwater runoff from small communities that do not exceed population thresholds, and stormwater runoff from undeveloped native forested uplands and wetlands, including both privately and publically owned properties. Because national data collecting and reporting standards do not exist for nonpoint sources, individual Bay jurisdictions and the CBP have faced many challenges in their efforts to accurately account for the implementation of nutrient reduction practices. Activities can be especially difficult to track when BMPs are implemented on a voluntary basis rather than under a more formal governmental program.

Each of the Bay jurisdictions submits data to the CBP at least annually on the nonpoint source nutrient and sediment pollution control programs implemented in the watershed. In past years, the CBP struggled to handle the wide variety of data formats and spent a large amount of staff time incorporating these data into the Chesapeake Bay Model. However, since 2003, the CBP and Bay jurisdictions have devoted substantial efforts and resources to standardize data formats and develop approaches for electronic submission of both permit compliance and BMP data. The EPA provided grants to Virginia, Pennsylvania, and Maryland to develop templates for submitting nonpoint source and stormwater BMP data to a statewide database, which would then facilitate transferral to the CBP via the National Environmental Information Exchange Network (NEIEN) schema (see Figure 2-1). Data can be submitted using one or more of the following types of information to identify BMP locations: (1) latitude and longitude, (2) watershed code, (3) county name, or (4) national hydrography dataset (stream reach) codes. Data are then translated for use in the Watershed Model and related tools (see Figure 1-3) to assess progress toward program goals, based on nitrogen, phosphorus, and sediment load reduction efficiencies assigned to each practice. The usefulness of the NEIEN-exchanged data is highly dependent on the quality of the data entered into the system. NEIEN was completed in late 2010, and by December 2010 all agencies were required to submit their BMP implementation data through NEIEN (B. Burch, EPA CBPO, personal communication, 2010).

Tracking changes in atmospheric deposition of nitrogen to the Bay watershed is the responsibility of the EPA, which uses data from several national monitoring networks. These networks provide a good estimate of wet deposition of nitrate and ammonium, a fair estimate of dry deposition of nitric acid, nitrate, and ammonium, and poor estimates of ammonia dry deposition (see Box 2-1 for details).

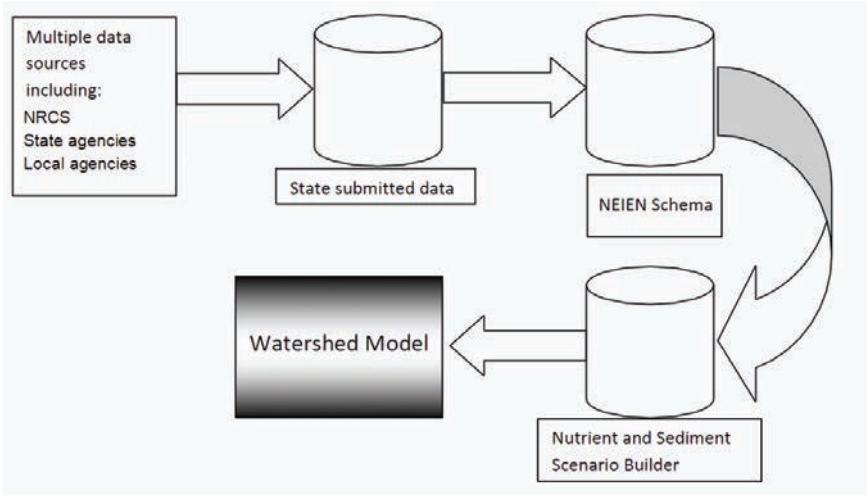

FIGURE 2-1 Role of NEIEN in data transmission to the Watershed Model.
SOURCE: Modified from Devereux (2009).

ASSESSMENT OF TRACKING AND ACCOUNTING

The committee was tasked to evaluate whether the tracking for implementation of nutrient and sediment control BMPs appears to be reliable, accurate, and consistent and to assess what is working and not working in each Bay jurisdiction and at the federal level (Tasks 1 and 2, Box S-1). To complete these tasks, the committee reviewed two main sources of information from each of the Bay jurisdictions: (1) a committee-generated questionnaire submitted to each of the Bay jurisdictions and the EPA and (2) relevant information submitted in the draft (September 1, 2010) and final (November 29, 2010) watershed implementation plans (WIPs). In this section, the committee provides a general assessment of tracking and accounting efforts and identifies key issues that affect multiple states. Jurisdiction-specific strengths and weaknesses in tracking and accounting are discussed briefly at the end of the section, summarized in Table 2-1, and detailed in Appendix C.

Jurisdiction-wide Issues in Tracking and Accounting

In general, the Bay jurisdictions responded that they have a good understanding of wastewater discharges and state cost-shared BMP data. However, key issues affecting the reliability, accuracy, and consistency of

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BOX 2-1
Tracking Nitrogen Deposition in the Bay Watershed

Tracking of nitrogen deposition is dependent upon measurements for specific locations and calibration/validation of models for regional assessments. A complete understanding of nitrogen loadings from the atmosphere requires information on the wet deposition of nitrate, ammonium, and organic nitrogen and on dry deposition of the gases nitric acid and ammonia and the aerosols nitrate and ammonium.

The most intensive coverage for atmospheric nitrogen loadings exists for wet deposition of nitrate and ammonium through the National Trends Network of the National Atmospheric Deposition Program (NADP); within the Chesapeake Bay watersheds, there are 16 sites, 5 of which have been in place since 1987. There is no systematic program to determine the deposition of organic nitrogen to the Bay watershed, which probably leads to underestimates of nitrogen deposition by up to 25 percent (Neff et al., 2002).

The next most detailed coverage is provided by the Clean Air Status and Trends Network (CASTNET) program, established in 1991, which measures the concentrations of nitric acid, ammonium, and nitrate and then uses the Multi-Layer Model (MLM) to estimate the dry deposition flux. Within the Chesapeake Bay watershed, there are six measurement sites across three states—in Maryland (BEL116, BWR139), Pennsylvania (ARE128, PSU106), and Virginia (PED108, SHN418), with starting dates from 1991 to 1995.

Estimates of the dry deposition of ammonia, an important source of nitrogen loadings to the Bay watershed, are not made within CASTNET. A new program, the Ammonia Monitoring Network (AMON), was initiated in 2010 as part of the NADP to provide this information. Unfortunately, only three sites (PA00, MD08, and MD99) are in the Bay watershed.

In summary, monitoring data exist to provide good estimates of wet deposition and fair estimates of dry deposition of nitric acid, nitrate, and ammonium; however, understanding of ammonia dry deposition is poor and deposition estimates are, therefore, weak. Importantly, funding for the NADP and CASTNET sites has declined in real terms, leading to a reduction in the number of sites. Static funding over the past decade, combined with increasing operational and maintenance costs, means further loss of sites is likely. A decline in monitoring sites and funding seriously limits the ability to understand and track changes in atmospheric nitrogen loadings in response to management actions.

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TABLE 2-1 Summary of Tracking and Verification Efforts for Land-based BMPs by Bay Jurisdiction

Jurisdiction	Who Collects Information for Nonpoint Source BMPs? (federal agencies not included)	Verification Process
Delaware	Multiple agencies, including: • Dept. of Natural Resources and Environmental Control • Dept. of Agriculture • local government agencies for stormwater BMPs	Field verifications are completed by each of the partner agencies. Aerial photography is used to verify the establishment of new agricultural BMPs annually. Cost-share reporting data is used to verify practice implementation. Stormwater BMPs field verified.
District of Columbia	Dept. of the Environment (DOE)	DOE conducts maintenance inspections of all stormwater management facilities. Inspections of wetland mitigation projects and recent tree plantings are also conducted.
Maryland	Multiple agencies including: • Dept. of Agriculture • Dept. of Environment (MDE) • Dept. of Natural Resources • Dept. of Planning • local government agencies	Field verification for all sectors. See Appendix C for details.
New York	Data compiled by MDE. The Upper Susquehanna Coalition (USC) collects and reports all nonpoint source data.	USC field checks agricultural and wetland-related practices. Only field verified practices are reported. Frequency of verification not reported.

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Process for Removing BMPs from the Database When Expired or Not Functioning?	Processes to Protect Against Double Counting?	Point Locations Provided?	Underreported Practices
NO	YES for ag. BMPs In development for stormwater BMPs	SOME (mostly in development)	• Non-cost-shared practices • Stormwater and septic practices where databases are lacking
No information provided. However, permitted facilities have maintenance plans.	YES, through Plan Review Database	YES, for most practices	• Street sweeping • Practices on private lands with no permit • Forest conservation
YES	YES for ag BMPs In development for stormwater BMPs	YES, for most practices	• Stream restoration • Septic upgrades funded by local govt. • Innovative BMPs not yet approved by the CBP
No information provided	No information provided	YES for ag. practices	Urban and septic practices are generally not reported

Continued

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TABLE 2-1 Continued

Jurisdiction	Who Collects Information for Nonpoint Source BMPs? (federal agencies not included)	Verification Process
Pennsylvania	Dept. of Environmental Protection tracks and collects BMP data for most sectors, with assistance from other agencies, including: • Bureau of Forestry • State Conservation Districts • Department of Agriculture • Infrastructure Investment Authority (PennVest)	Verification and quality assurance of implemented agricultural BMPs are considered to be the responsibility of the federal and state agencies and the nongovernmental organizations providing the information. It is beyond the capacity or responsibility of PA's Water Planning Office to complete such tasks. No information is provided about state agency-level verification. Construction-related stormwater BMPs are permitted and verified.
Virginia	Many agencies including: • Dept. of Health • Dept. of Environmental Quality • Dept. of Forestry • Dept. of Conservation and Recreation • Dept. of Agriculture and Consumer Services	Permitted CAFOs currently inspected annually, after 7/1/2011 on a risk-based inspection schedule at least once every 5 years Inspections on land-disturbing activities for stormwater pollution prevention Up to 5% installed agricultural BMPs annually BMPs that are also alternative onsite sewage systems inspected at least annually.
West Virginia	Dept. of Environmental Protection tracks and collects BMP data for most sectors, with assistance from: • Dept. of Agriculture • Conservation Agency	No current field verification process in place, although WV plans to develop verification protocols for stormwater and agricultural BMPs.

NOTE: This table summarizes the more detailed data provided by each Bay jurisdiction on tracking and accounting (see Appendix C).

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Process for Removing BMPs from the Database When Expired or Not Functioning?	Processes to Protect Against Double Counting?	Point Locations Provided?	Underreported Practices
No information provided	NO (No additional processes beyond those used by all states to track BMPs by funding sources)	NO	• Cover crops • No-till cultivation • Manure storage • Stream fencing • Rotational grazing • Precision feeding • Septic tank hook-ups to central sewer No tracking of construction-related stormwater BMPs (an estimate of practices is instead provided)
No practice life reported, but BMPs can be removed if found on random inspections to be insufficient	YES for ag BMPs	YES for cost-shared ag. practices (others in development)	Septic systems connections Non-cost shared practices Urban stormwater BMPs over past 20 years Practices not approved by CBP
No information provided	YES	YES for stormwater practices	Non-cost-shared practices Practices missed because of poor tracking

BMP tracking and accounting data include: (1) data privacy restrictions, (2) the challenge of accounting for voluntary practices, (3) limitations in staff resources for data management and quality assurance/quality control (QA/QC), (4) limitations in staff resources for field verification of practices, and (5) uncertainty in BMP load reduction effectiveness.

Data Privacy Restrictions

Much information regarding agricultural point and nonpoint source nutrient and sediment reduction activities within the Bay watershed resides within the U.S. Department of Agriculture (USDA), but privacy requirements associated with Section 1619 of the 2008 Farm Bill create challenges for accurately tracking agricultural BMPs. Under Farm Bill privacy requirements, federal and state agencies may not publicly release the addresses (or location data) for Farm Service Agency (FSA) or National Resources Conservation Service (NRCS) grant recipients. To comply with these privacy restrictions, these data previously have been submitted to the CBP aggregated at the county level, which reduces the spatial accuracy of calculated nutrient and sediment loads in the Watershed Model. However, a recent data sharing project between the U.S. Geological Survey (USGS), the FSA, and the NRCS in all Bay states allows the USGS to receive the point location data in confidence and aggregate these data at a watershed scale (hydrologic unit code [HUC] 8 or 11), for improved BMP location attributes in the Watershed Model, before submitting these data to the CBP. Aggregated data that do not divulge individual landowner information is not confidential.

This data sharing project has the potential to fill many of the information gaps about distribution of Farm Bill–funded BMPs implemented across the landscape. Additional opportunities to access aggregated data that do not violate the confidentiality provision of the Farm Bill could be used by the CBP. For example, records of nutrient management plans developed under Farm Bill programs could be compiled and reported in such a way that Bay jurisdiction administrators would at least know how many agricultural acres in each watershed county were being managed under an NRCS-developed or NRCS-approved nutrient management plan. However, some nutrient management plans are developed by state-certified plan writers. Because these plans are paid for by the land owners, they are proprietary. Thus, important nutrient management information may not be available to the USDA-USGS data sharing effort and to the CBP.

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Non-cost-shared (Voluntary) Practices

Every Bay jurisdiction reports that there is little to no accounting for the implementation of BMPs that are installed without the support of federal or state cost-shared programs, sometimes called "voluntary practices." Many agricultural and other BMPs are voluntarily implemented because of their inherent benefits to landowners. For example, significant acreage is farmed within no-till and other conservation tillage practices without regard to the CBP because they are good agronomic practices that permit double cropping and increase economic returns. The underreporting of non-cost-shared practices also affects the accounting of suburban and urban practices (e.g., stream restoration efforts by nonprofit organizations, non-cost-shared sewer line hook-ups). See Table 2-1 for examples of practices described by each jurisdiction as underreported.

Pennsylvania recently conducted several regional studies to document this data gap, focusing on key subsets of agricultural conservation practices. A pilot study that surveyed 17 percent of the farmland in Bradford County in northeastern Pennsylvania reported that up to 88 percent of the nutrient-control practices being used were not reported to the CBP because they were not cost-shared (PA DEP, 2010; see Table 2-2). However, the study did not attempt to quantify the effect of this under-reporting on the county's (or the state's) reported nutrient or sediment loads. The Pennsylvania study suggests that key practices may be significantly under-reported in some areas. Overall, available data are insufficient for the committee to assess the implications of non-cost-shared practices for accuracy of current BMP reporting in the various states or to evaluate the relative magnitude of this error against other potential accounting errors.

Maryland has recently implemented an aggressive inventory strategy to track and verify non-cost-shared practices and in 2009 launched the Conservation Tracker database, which can be used to track both cost-shared and non-cost-shared BMPs (MDE et al., 2010). However, as of fall 2010,

TABLE 2-2 Surveyed Agricultural BMPs in Bradford County, Pennsylvania

Practice	Data Reported	Percent Not Cost-Shared
No till	6,039 acres	85
Cover crop	3,335 acres	74
Manure storage	81 units	43
Stream fencing	79 farms/339 acres	51
Rotational grazing	74 farms/4,679 acres	88

SOURCE: PA DEP (2010).

Conservation Tracker was only being used to track cost-shared practices (MD DNR, 2010b). In November 2010, Virginia outlined a multi-phased strategy to collect, store, and report non-cost-shared agricultural and forestry BMP data, although it acknowledged that better accounting for non-cost-shared practices alone would not enable the state to reach its milestone goals (VA DNR, 2010). Delaware developed a BMP survey form through a pilot study in the Choptank River watershed that could be used in the future to collect data on non-cost-shared practices (DE DNREC, 2010).

If voluntary BMP implementation is not significant in a particular state, then federal or state cost-shared practice information will by necessity have to suffice. However, if states find that non-cost-shared practices significantly affect their total loads, then rigorous state-level programs would be of value to facilitate data collection, verification, and quality control and to assess progress towards management goals. President Obama's 2009 Executive Order 13508 pledged: "By July 2012, mechanisms for tracking and reporting of voluntary conservation practices and other best management practices installed on agricultural lands will be developed and implemented." As of early 2011, the CBP partners, with USDA and state leadership, were still considering how they will implement non-cost-shared BMP tracking while ensuring that data meet CBP expectations for reliability, accuracy, and verification. The EPA has explained its expectations for non-cost-shared BMP data, including procedures to prevent double counting, to allow for field verification, and to ensure that the datasets are updated over time to reflect land conversions or maintenance failures (EPA, 2010c,d; K. Shenk, CBP, personal communication, 2011). The CBP will also need to consider that current models have been calibrated with many of these uncounted practices in place. Therefore, if these non-cost-shared practices are eventually added to the model even though they were in place during the model calibration period, their load reductions may effectively be double counted.

Data Management

Currently, CBP data management and quality control efforts are staff- and resource-intensive endeavors, especially as the program transitions to electronic BMP reporting. Tracking BMP data from multiple data sources requires rigorous QA/QC efforts, and weaknesses in state-level programs combined with resource limitations will contribute to reduced accuracy and reliability. For example, double counting can occur when a specific BMP receives both state and federal funding. USDA privacy restrictions may also limit the capacity to cross-check state- and federally funded BMPs and other conservation efforts to minimize double counting. Other errors that affect data quality include incorrect entry of BMP data from stormwater permit reporting or failure by states to remove from the database BMPs

that are no longer in operation, perhaps because they have exceeded their reasonable lifespan or because the land use has changed since the BMP was implemented.

Of the seven Bay jurisdictions, only Maryland, the District of Columbia, Virginia, and Delaware reported specific practices to reduce double counting, and those practices were sometimes limited only to certain sectors (see Appendix C). Additionally, only Maryland reported that BMPs were assigned specific lifespans, after which those BMPs would be removed from the database. Many states expressed optimism that electronic reporting via NEIEN would significantly reduce double counting of cost-shared BMPs. NEIEN, however, may simply transfer this problem from the states to the CBP if the cost-share data are not first screened for double-counting at the state level prior to electronic submissions. Cost-share privacy issues would need to be addressed to fully resolve this problem as each BMP would require a unique identifier such as a specific location to facilitate cross-checking of activities between state and federal databases.

In addition to improving data quality, electronic submissions of local and state BMP data should also significantly reduce the data management burden on state staff, particularly for those states that previously had to compile data from paper files. Nevertheless, there appears to be unequal progress toward improving data management among the Bay jurisdictions. Those jurisdictions with greater resources can devote more attention to data management and electronic data submissions. Those with greater resources are also more likely to invest in training for local agency staff on how to manage data effectively and accurately and how to use available tools for nutrient accounting.

Resources not only affect the staffing levels for data management and QA/QC, they also affect the ability to record precise locations of practices (i.e., geo-referencing), which is under way in some states (see Table 2-1). The precise location of a BMP within a watershed (e.g., distance from a stream) will affect its performance; thus, geo-referencing BMPs is critical to improving the Watershed Model's predictions of nutrient load reductions (Djojic et al, 2002). States with limited resources would, understandably, prefer to spend available funding on BMP implementation rather than on tracking and accounting efforts, perhaps sacrificing some level of reporting accuracy for greater load reductions in the long run.

Field Verification

The extent of field verification of urban and agricultural nutrient and sediment BMPs varies widely with state resources. Field verification ensures that the BMP implementation data are reliable and accurate and that the installed practices meet the definitions and design standards used by the

CBP to estimate efficiency and performance. However, the necessary staff and travel expenses make field verification extremely costly. Field inspections ideally should occur when BMPs are actually performing (e.g., during or shortly after rain events). Timing field inspections in this way would significantly improve the reliability of verification results. Virginia, the District of Columbia, Maryland, and New York reported that they have programs in place to field verify BMP implementation and maintenance. However, at most, these programs field verify approximately 8-10 percent of agricultural BMPs per year; most programs verify far fewer or do not report the number of verified sites. Details on these verification programs are provided in Appendix C. Because of staffing and financial limitations, adequate state or federal funding to visit every participating landowner to verify recordkeeping and other implementation-related data seems unlikely. Also, in many cases, agencies charged with implementing BMPs are the same as those conducting the tracking and accounting, sometimes leading to a perception of a biased verification system. Random verification programs by agencies/personnel independent of those advising installation help to build confidence that reported data are accurate and reliable and can be sized to available resources.

Ultimately, a reasonable balance of implementation and verification is necessary to optimize resources while maintaining the CBP's credibility. The EPA has indicated that jurisdications will need to develop programs to verify that BMPs are properly designed, installed or implemented, and maintained to get full credit in the Watershed Model (EPA, 2010c). Additional EPA guidance on the extent of verification in relation to expected benefits would be useful. As a surrogate for field verification, grower and developer survey questionnaires could be mailed to gauge participation, followed by some percentage of field visits to confirm the reliability of the survey data. For example, available trends in county-level fertilizer sales data could be used to gauge the extent of nutrient management related BMP implementation. Remote sensing also might offer lower cost verification of some practices. Early verification is important to determine whether practices have been implemented according to recommended standards, but some level of periodic verification is also needed to determine whether practices are still in place and are being maintained properly. Developing ways to optimize field verification efforts will ultimately enhance the reliability of the BMP data sets, perhaps through some combination of remote sensing data, written surveys, phone calls, and site visits.

BMP Efficiencies

Data on BMP implementation are converted into load reductions by the Watershed Model using load reduction efficiencies established by the

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Water Quality Goal Implementation Team (WQGIT) of the CBP. Thus, load reduction efficiencies are critical components of both goal-setting and implementation progress accounting.

The efficiencies of municipal and industrial wastewater nutrient control technologies are well understood because of the high level of process control at centralized wastewater treatment facilities. In addition, NPDES permitting requires monitoring at centralized treatment facilities, so results of management actions accurately reflect nutrient and sediment load reductions in the field.

In contrast, the BMP efficiencies for diffuse sources, such as suburban, urban, and agricultural nonpoint sources, are less predictable and vary widely with local site conditions. Many factors affect the pollutant removal efficiency of BMPs and create challenges for establishing BMP efficiencies for the Watershed Model. Field monitoring of BMPs on a comprehensive basis is neither practical nor affordable.

Performance of BMPs in the field may vary with age and level of maintenance. The lack of adequate maintenance and life-cycle replacement can reduce intrinsic pollutant removal design capabilities and negatively affect performance. BMP efficiency can also change as treatment systems age; those systems that rely on natural biological features may improve with maturity but act as a sink during the growing season and a source of nutrients during the non-growing season even after they mature. Technology-based BMPs (e.g., storm drain filter inserts) may lose effectiveness with time due to clogging and general wear and tear.

BMP efficiency is also a function of location and site conditions, which vary widely. BMP efficiency is heavily influenced by rainfall amount, intensity, and duration; soil type and slope; land use; and proximity to the receiving water body. Implementation, operation, and maintenance of agricultural BMPs also may vary widely from the NRCS Conservation Practice Standard. For instance, cover crops can vary by type of crop used, extent of ground cover achieved, whether manure is applied, and whether the cover crop is harvested, plowed in, or left as protective cover on the field, each of which affects the overall practice efficiency. Thus, as noted previously, it is important to verify that the installed practices meet the definitions used by the CBP to establish efficiency estimates.

BMP efficiency in a field situation can be difficult to study because of the costs and challenges associated with monitoring, especially when pollutant loading is driven by weather events that can be erratically distributed in time and space. As a result, BMP efficiencies are often derived from limited research or small-scale, intensive, field-monitoring studies in which they may perform better than they would in aggregate in larger applications, particularly at the watershed scale. Thus, estimates of load reduction efficiencies are subject to a high degree of uncertainty.

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Concerns about the accuracy of BMP load reduction efficiencies used in the Watershed Model led to a detailed review of currently available science for both urban and agricultural practices (Simpson and Weammert, 2009). The EPA (2010e) also provided extensive land management guidance that is applicable to federal and non-federal lands and that addresses agriculture, urban and suburban areas, forestry, riparian areas, decentralized wastewater treatment systems, and hydromodification. Simpson and Weammert (2009) and the EPA (2010e) provide detailed assessments of BMP applications and efficiencies, including offsets for land use changes. A review of the Simpson and Weammert (2009) efficiencies acknowledges a predictably high degree of spatial and temporal variability and uncertainty depending on hydrogeomorphic region, land use, and to a certain extent type of BMP (Table 2-3). Because of the variety of factors affecting BMP efficiency, including maintenance and longevity effects, Simpson and Weammert (2009) were conservative in their efficiency estimates.

The committee did not undertake a separate detailed review of BMP load reduction efficiencies, although the original documentation by Simpson and Weammert (2009) and the EPA (2010e) were thoroughly peer-reviewed prior to publication. In addition, BMP efficiencies have been the subject of numerous studies, especially by the Center for Watershed Protection

TABLE 2-3 Range in Load Reduction Efficiency (percent decrease) Estimates for Select Best Management Practices implemented in the Chesapeake Bay Watershed

Best Management Practice	Total N	Total P	Sediment
Conservation plans	3–8	5-15	8-25
Conservation tillage	8	22	30
Forest buffer	19-65	30-45	48-60
Grass buffer	13-46	30-45	40-60
Wetland creation and restoration	7-25	12-50	15
Cover crops			
Coastal plains/ Piedmont—crystalline	11-45	0-15	0-20
Mesozoic lowlands/Ridge and Valley—siliciclastic	9-34	0-15	0-20
Ammonia emission reduction	15-60	NA	NA
Dairy feed management	24	25	0
Mortality composting	40	10	0

SOURCE: Adapted from Simpson and Weammert (2009).

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(CWP), the Water Environment Research Foundation (WERF), and the EPA.[1] Although unable to review and assess the technical aspects of BMPs and their efficiencies, the committee endorses the approach taken by the CBP to develop research-based BMP efficiencies and concludes that the general approach and associated conservative assumptions are reasonable given currently available science.

Despite this endorsement, the committee acknowledges the need to continuously assess and improve upon the current understanding of BMP efficiencies. Therefore, targeted monitoring programs in representative urban and agricultural streams are needed to evaluate associated water quality changes over time and to validate or improve model predictions, particularly at the watershed scale.

As new field research becomes available, BMP efficiencies for the Watershed Model should be updated. The CBP WQGIT recently developed a protocol by which estimates of BMP efficiencies can be revised or additional BMPs can be accepted for use in the Watershed Model (CBP WQGIT, 2010). This protocol provides an adaptive approach to reducing the high levels of uncertainty in estimates of BMP efficiencies. The protocol requires a six-person panel composed of experts in water quality and experts in the proposed BMP to work with the relevant source-sector workgroup to develop a report that includes:

- Detailed definition of the land use or practice,
- Estimates of recommended nitrogen, phosphorus, and sediment loading or efficiency, and justification for the selected efficiency estimates,
- Locations in the watershed and land uses to which the BMP is applicable,
- Conditions under which the BMP works and does not work,
- Temporal performance,
- Useful life and effectiveness over time, and
- Operation and maintenance requirements (and impacts of neglect).

The relevant source sector workgroups, the Watershed Technical Workgroup, and the WQGIT review the panel's recommendations before the BMP is adopted for use in the Watershed Model. This strategy appears to be a reasonable, consensus-based mechanism to assign pollutant removal efficiencies to new practices not currently represented in the model (e.g., low-impact design, state-of-the-art stormwater controls) and update BMP efficiencies or offsets from land-use conversions with new data, while main-

[1]For details and references, see CWP—http://cwp.org/; WERF— http://www.werf.org//AM/Template.cfm?Section=Home; and EPA water programs—http://www.epa.gov/owow_keep/nps/chesbay502/downloads.html.

taining rigorous review standards. Past experience, however, has shown that credited BMP efficiencies have more commonly been decreased rather than increased in the light of new field information.

What Is Working and Not Working in Each Jurisdiction and in the Federal Agencies

As previously described, the Bay jurisdictions' tracking and accounting approaches vary substantially. Programmatic components are summarized in Table 2-1, and full details are provided in Appendix C. Ideally, each Bay jurisdiction would have a clear organizational framework for BMP reporting, geo-located data for accurate conversion of the data into the Watershed Model, a rigorous QA/QC process that includes some level of field verification, a process for removing BMPs when they have expired or are not functioning, processes to prevent double counting, and few unreported practices. In reality, most jurisdictions are still working through these challenges, and there are significant disparities between the human and financial resources applied to tracking and accounting across the states. All of the Bay jurisdictions are working to improve their practices, but resources remain the primary limiting factor.

BMP Reporting and Transparency

All Bay jurisdictions have identified an organizational reporting structure for tracking and accounting among various state and local agencies, although the complexity of these structures varies widely. The District of Columbia reports all data through a single agency, which simplifies data collection, quality control, and reporting, but most states have more complex multi-agency reporting responsibilities. Some Bay jurisdictions suggested communication would improve if each jurisdiction and the CBP had a single point of contact for tracking and reporting issues.

Most Bay jurisdictions report BMP implementation on an annual basis to the CBP (on December 31, for the prior July-June period), and all jurisdictions are required to submit these data through NEIEN. Although the recent conversion to the NEIEN schema promises to improve data management, the system appears to have made the data less accessible to some jurisdictions. Whereas, previously, states compiled their BMP data from multiple agencies on an annual basis, now many state and local agencies submit their data separately. Thus, a jurisdiction may now only see its overall annual progress update after it has been compiled by the CBP, unless it has procedures in place to separately compile the data. Because of the time it takes for the CBP to compile the data and run the models to convert the BMP data into load reductions, significant delays (currently a minimum of

9 months) occur between BMP implementation and progress assessments, which hinder the application of adaptive management (see Chapter 4). Only Maryland reports its implementation progress more frequently via its own BayStat website, which it uses to make frequent adjustments to its BMP program to ensure achievement of its milestone goals.[2]

In January 2011, the CBP launched a new tracking and accounting system (Bay TMDL Tracking and Accounting System [BayTAS]) to track all of the Bay jurisdictions' progress toward meeting the TMDL requirements. BayTAS will be used to track progress for both point and nonpoint sources using geographic information system (GIS) technologies and the Watershed Model, and data will be displayed by state, segment, or facility on the CBP's new ChesapeakeStat website.[3] Among the questions the EPA expects to answer with BayTAS are:

- What is the status of BMP practice implementation and programmatic activities?
- What is the status of two-year milestone achievement?
- Are point source wasteload allocations being achieved? Are nonpoint source load allocations being achieved?
- Are states on target to achieve the Bay TMDL?

Because the forum is publicly accessible, BayTAS also improves the transparency of implementation data (P. Rana, EPA, personal communication, 2011). It remains unclear whether the system could be used for more frequent reporting by Bay jurisdictions to provide them with a tool to assess their progress toward the two-year milestones.

All Bay jurisdictions reported challenges in counting and reporting voluntary practices, as discussed earlier in the chapter. Only Maryland has developed a process to report voluntary practices, although it has not yet been implemented. Virginia and Delaware are actively developing and other states are considering such a process. Some jurisdictions also mentioned that they do not report some practices because of insufficient databases (e.g., septic system upgrades or hook-ups, stormwater practices) or challenges in converting the data into the format expected by the CBP (e.g., street sweeping). The EPA is working to overlay wastewater service areas to identify those areas served by septic systems in Phase 5.3 of the Watershed Model.

[2]See http://www.baystat.maryland.gov/.
[3]See http://stat.chesapeakebay.net/.

Geo-referencing

Three Bay jurisdictions geo-reference all or most BMPs that are tracked (i.e., New York, Maryland, District of Columbia); three states provide point locations for at least some BMPs (Virginia, West Virginia, Delaware; see Appendix C for details). Pennsylvania does not provide point locations for BMPs but instead reports them by county. Those locations that are not geo-referenced are typically reported by county, although some are reported by watershed or stream reach. Even Bay jurisdictions that collect location data for all new practices face challenges in siting historical BMPs that remain in the database. If BMPs are reported by county, then the EPA must make assumptions regarding the locations of these practices within specific watersheds. Proximity of the land use and BMPs to a water body is one of the major factors that affect the delivery of pollutants (Djojic et al., 2002). Thus, without accurate geo-location of urban and agricultural BMPs, there will be errors in accounting for BMP impacts on pollutant loads.

Quality Assurance and Quality Control

Field verification of agricultural BMPs is limited for some Bay jurisdictions (e.g., West Virginia, Pennsylvania), while other jurisdictions have implemented structured field verification programs (e.g., Virginia verifies up to 5 percent of agricultural BMPs annually, Maryland verifies 7-8 percent of agricultural BMPs annually, and New York verifies all reported practices). Most states reported some level of field verification for permitted stormwater management practices.

QA/QC of BMP data varies across the states. Maryland, the District of Columbia, Virginia, West Virginia, and Delaware reported specific strategies in their WIPs to reduce double counting of BMPs (DDOE, 2010; DE DNREC, 2010; MDE et al., 2010). Virginia reported that privacy agreements have only recently allowed its agencies to examine FSA or NRCS data to check for double counting in a manner that is consistent with Farm Bill privacy-related restrictions. Only Maryland and Virginia reported processes to remove BMPs when they are no longer functioning or have expired. As a result, "legacy" BMPs and double-counted BMPs from some jurisdictions will result in overestimating the extent of nutrient load reductions.

Despite inconsistencies in philosophy and approach, a great deal of information is available, and good faith efforts are under way to resolve some of the hindrances to data access, collection, and standardization (see Appendix C). The Bay jurisdictions are not likely to modify their respective programs to bring them into perfect alignment, but they are developing their own tailored programs based on their own circumstances and

priorities. Although statewide programs are unlikely to be identical to one another in process or in fiscal and personnel allocations, the CBP has recently made strides toward common reporting goals and data requirements, in part because of the WIP process. The Bay jurisdictions are adapting to these data quality expectations, and some jurisdictions are much closer to meeting these expectations than others. However, electronic data management, new databases, and data transfer schema should ultimately reduce the BMP tracking and accounting burden for all jurisdictions.

How Do Gaps and Inconsistencies in Tracking Affect Reported Program Results?

As described above, the current tracking and accounting of BMPs is not consistent across the Bay jurisdictions. The committee was also tasked to evaluate the accuracy and reliability of the BMP tracking data and assess how gaps and inconsistencies appear to impact reported program results (Tasks 1 and 3, Box S-1). Thus, the committee attempted to estimate the extent of error in the BMP implementation data. On the one hand, the CBP could under-count BMP implementation rates and levels because state-reported data do not include non-cost-shared practices. Given that at least some of these practices were in place when the model was calibrated, the extent of error that these uncounted practices introduce into the overall simulations is unclear. Even recent pilot studies to quantify these differences at a county scale (e.g., Table 2-2) did not extrapolate the findings to nutrient load estimates. On the other hand, the model could over-count BMP implementation rates and levels, because few states account for the loss of BMPs when they are no longer in place or no longer effective or for known double-counting problems. State quality assurance project plans (QAPPs) generally do not specify procedures to evaluate differences between quantities of activities reported to the CBP and actual on-the-ground implementation, despite the EPA's request that jurisdictions include such information in the QAPPs (J. Winters, EPA, personal communication, 2010).

The nonuniformity of BMP efficiencies can lead to inaccuracies in Watershed Model simulations. Any error in accounting for the areal extent of implemented BMPs will have direct impact on the load simulations. Such errors can cause either under- or over-estimation of loads by the Watershed Model. Furthermore, there are several discrepancies between a state's and CBP's definitions of BMP management that affect the accuracy of the calculated nutrient load reductions. For example, states allow application of manure to cover crops, while the CBP definition for cover crops assumes no manure is applied.[4]

[4]No manure is applied except on commodity cover crops after March 1.

Appendix S

BOX 2-2
Florida Agricultural Nonpoint Source Best Management Practices Summary

The Florida agricultural BMP program was formalized in state law with the passage of the Watershed Restoration Act (WRA) (Ch. 403.067 F.S.) in 1999. The WRA is Florida's blueprint for development and implementation of TMDL provisions of the Clean Water Act primarily focused on achieving nutrient load reductions to impaired water bodies. Implementation of a TMDL through adoption of a Basin Management Action Plan requires agricultural landowners to either implement BMPs or monitor water quality. The WRA charges the Florida Department of Agriculture and Consumer Services (FDACS) with the responsibility for agricultural BMP development.

The WRA mandates that agricultural BMPs be: (1) based on sound science (generally using University of Florida expertise); (2) adopted by administrative rule into the Florida Administrative Code; (3) verified as effective by the Florida Department of Environmental Protection initially using best professional judgment followed by water quality monitoring; and (4) revised accordingly, with revisions implemented by participating landowners, if BMPs are found ineffective in meeting water quality goals. All FDACS BMP programs mandate the implementation of nutrient management plans.

The WRA also requires that FDACS develop and adopt by Rule a formal procedure for agricultural landowners to enroll their lands in the BMP program. This procedure requires landowners to submit name and contact information, land parcel tax identification number(s), crops be-

Based on the information provided, the overall accounting of BMPs in the Bay watershed cannot be viewed as accurate. However, the committee was not able to determine the magnitude or the likely direction of the overall reporting error (that is, whether the actual load reductions of currently implemented practices are likely to be greater or less than the current modeled output based on the practices counted). Some of these errors will likely cancel each other out, but there is substantial room for improvement. Additionally, the committee was unable to determine whether the actual data reported by each jurisdiction are reliable and accurate. The only way to truly assess the reliability and accuracy of the reported data would be through independent (third-party) auditing of the tracking and reporting at state and local levels.

ing produced, and specific BMPs being implemented. Landowners who enroll in the BMP program and implement all applicable BMPs receive a "presumption of compliance" with nutrient water quality standards and become eligible for state cost-share funding. Eighty-three percent (1.5 million acres) of statewide irrigated agricultural acreage is enrolled. An additional 6.6 million acres of nonirrigated land is also enrolled. The current total of 8.1 million acres will expand dramatically over the next year as the focus for enrollment will be on the largest agricultural land use in Florida: improved and unimproved pasture land for beef cattle production. FDACS BMP programs now cover forestry, citrus, vegetables and row crops, sod, containerized nurseries, specialty crops (tropical fruit, blueberries, pecans, etc.), and beef cattle. BMP programs are under development for the equine and field-grown nursery industries.

FDACS has also developed a quality assurance program to follow up with enrolled landowners to verify that they are implementing the BMPs identified on their submitted documentation. On a statewide basis, the quality assurance program consists of grower surveys and site visits to verify survey results for a fraction of the respondents. In high-priority watersheds (the Suwannee River and Lake Okeechobee Basins) participating landowners are visited in greater proportion and frequency.

Since the inception of the program, Florida has spent $75.5 million on developing, implementing, and evaluating agricultural BMPs. This state money has leveraged in excess of $200 million in USDA/NRCS Environmental Quality Incentives Program (EQIP) funding over the same period of time. FDACS estimates that landowners have contributed at least $60 million in capital costs, not including long-term operation and maintenance.

HOW CAN THE TRACKING SYSTEM BE STRATEGICALLY IMPROVED?

Although many programs are actively in place to improve the tracking and accounting system, in this section the committee proposes additional strategies that could improve BMP tracking in the CBP.

A Consolidated Chesapeake Bay Region Agricultural BMP Program

All Bay jurisdictions lack the ability to reliably and consistently document agricultural nonpoint source BMPs that are implemented without the assistance of federal or state cost-share programs. These shortcomings could be overcome by the development and implementation of BMP

programs similar to those that exist elsewhere in the nation whereby agricultural producers report voluntary conservation practices that would otherwise be unaccounted for (see Florida example in Box 2-2).

The establishment of a regional BMP program, perhaps coordinated by an independent organization or alliance of organizations (e.g., the American Farm Bureau Federation, the National Association of Conservation Districts) with close coordination with the Bay jurisdictions' respective Departments of Agriculture, would lay the foundation for a more formal program to track and account for voluntary BMPs. This BMP program could include record keeping and reporting requirements, including reporting of geo-locations for BMP data. Verification of BMP implementation could occur through random field inspections of a percentage of program participants. The BMP efficiencies could be assessed through representative site water quality monitoring coupled with watershed or sub-watershed-scale monitoring, which would serve to document a range of nutrient load reduction estimates for prioritized conservation practices. Initially, financial and human resources for this program could be focused on the regions of each state that are within the Bay watershed, although state TMDL initiatives would likely benefit from such programs implemented statewide.

Coupling cost-share eligibility (for those states that allocate cost-share funds) to BMP program participation is an effective mechanism to entice landowners to participate. Structured properly, a state program can also leverage USDA cost-share funds and further reduce landowner costs for BMP implementation. Reducing property taxes for participating agricultural landowners would likely be an effective incentive, although local governments would suffer lost revenues. Finally, disincentives are possible tools, such as requiring parcel-scale water quality monitoring if landowners choose not to implement BMPs. Providing agricultural producers who implement, report, and maintain BMPs with a presumption of compliance with water quality standards has proven to be a powerful incentive for landowners in Florida and has contributed to successful long-term operation and maintenance of implemented BMPs (Box 2-2). USDA has recently begun discussions with EPA and Bay jurisdictions about developing a similar such program in the Chesapeake Bay, where farmers would agree to implement certain practices in exchange for presumptive compliance with regulations (A. Mills, USDA, personal communication, 2011).

Expanded Geo-location Data

Although some states are working toward geo-referencing all BMPs, most states are far from this goal. Geo-referencing will improve the tracking of implemented BMPs with time, allowing easier quality control checks for double counting and improving the accuracy of siting in the Watershed

Model, thereby improving the accuracy of the modeled loads. Once accurately geo-located, the information can be used in increasingly finer scale models. Geo-referenced data can also help to assign proper pollutant delivery ratios in the Watershed Model and to prioritize BMP inspections based on the proximity of BMP implementation to the receiving water body, as described by Djojic et al. (2002).

CONCLUSIONS AND RECOMMENDATIONS

Accurate tracking of BMPs is of paramount importance because the CBP relies upon the resulting data to estimate current and future nutrient and sediment loads to the Bay. However, many Bay jurisdictions and localities are struggling with limited resources, complex and rapidly changing data reporting mechanisms, data privacy constraints, and QA/QC needs. Verifying the continued functioning and effectiveness of historical activities presents a significant challenge. Although state tracking and accounting programs are unlikely to be identical, the CBP has recently made strides toward common reporting goals and data requirements through the watershed implementation plan (WIP) process, the NEIEN, and the recent launch of BayTAS.

The current accounting of BMPs is not consistent across the Bay jurisdictions. Additionally, given that some source-sector BMPs are not tracked in all jurisdictions, the current accounting cannot on the whole be viewed as accurate. Although the Bay jurisdictions have a good understanding of point-source (i.e., wastewater) discharges, numerous issues affect the accuracy, reliability, and consistency of BMP reporting to the CBP. Only five of the seven Bay jurisdictions conduct any level of field verification of agricultural practices, and there are known problems with double counting that agencies are working to resolve. Only one Bay jurisdiction specifies a lifespan for practices recorded in the database, and few jurisdictions have mechanisms to identify and remove from the database practices that are no longer functioning or even in place. Current tracking systems do not account for agricultural practices that are not cost-shared by a government agency. Given these limitations, current accounting can be considered, at best, an estimate.

The committee was unable to determine the reliability and accuracy of the BMP data reported by the Bay jurisdictions. Independent (third-party) auditing of the tracking and accounting at state and local levels would be necessary to ensure the reliability and accuracy of the data reported.

The committee was not able to quantify the magnitude or the likely direction of the error introduced by BMP reporting issues. On the one hand, there is under-counting of BMPs because the jurisdictions do not currently report non-cost-shared practices, although the model calibration

may include the effects of some of these practices. On the other hand, there is over-counting of BMPs because few states account for the loss of BMPs when they are no longer properly maintained, functioning, or in place. Furthermore, there are errors introduced by site-level variability in BMP effectiveness, insufficient data on the location of BMPs, and discrepancies between state and CBP definitions of BMP management.

A consolidated regional BMP program to account for voluntary practices and increase geo-referencing of BMPs presents opportunities to improve the tracking and accounting process. A regional BMP program with incentives for participation as well as penalties for lack of participation has been effectively used in Florida to increase participation and improve data quality. Geo-referencing enables managers and modelers to identify the parcel-level location of BMPs, which would aid in inspecting, tracking, and assigning proper delivery ratios and BMP efficiencies, thereby improving the accuracy of the modeled estimates of nutrient and sediment loads delivered to the Bay.

Targeted monitoring programs in representative urban and agricultural watersheds and subwatersheds would provide valuable data to refine BMP efficiency estimates, particularly at the watershed scale, and thereby improve Watershed Model predictions. Current BMP load reduction efficiency estimates used in the Watershed Model are reasonable estimates of the short- to intermediate-term reduction efficiencies of newly installed BMPs at the field scale and gross representations of the same at the watershed scale. These estimates contain significant uncertainties caused by site-specific factors, practice design, extent of maintenance, and challenges in scaling up the data from the plot or field scale. Pilot studies in several subwatersheds should be conducted to quantify BMP performance, particularly for the most common practices with the greatest uncertainty in their efficiency estimates. The CBP has recently implemented a review process to refine BMP efficiencies used in the Watershed Model based on emerging research findings.

Additional guidance from the EPA on the optimal extent of field verification of practices in relation to expected benefits would improve tracking and accounting of both cost-shared and voluntary practices. Field verification is costly, and several states have questioned its value given the resource constraints that limit BMP implementation. Although independent random or probabilistic verification programs increase public confidence that reported data are accurate and reliable, attention should be given to developing ways to optimize field verification efforts that enhance the reliability of the BMP data sets, perhaps through the combined use of remote sensing data, written surveys, phone calls, and in-person visits.

Electronic tracking and data transfer systems are likely to improve the quality of reporting and reduce the jurisdictions' tracking and account-

ing burden but may currently be contributing to delayed assessments of implementation progress. Despite the concerns in tracking and accounting noted above, a great deal of information is available, and a plausible and collective effort seems to be under way to resolve some of the hindrances to data access, collection, and standardization. However, because implementation data are now reported electronically, several jurisdictions noted that the data are less accessible for assessments of statewide progress. Some Bay jurisdictions have mechanisms in place to compile progress updates as needed, but others have to wait approximately 9 months after the end of the reporting period for a summary of BMP implementation progress from the CBP. The recently launched tracking and accountability system for the TMDL (BayTAS) and ChesapeakeStat, which documents each jurisdiction's progress in a publicly accessible website, should incorporate mechanisms for more timely reporting and consolidation of federal and state data submissions.

Appendix T. CAC BMP Verification Related Correspondence

Citizens Advisory Committee
TO THE CHESAPEAKE EXECUTIVE COUNCIL

January 3, 2012

Dear Principals' Staff Committee:

As your citizen advisors, we respectfully offer our recommendations for action that you can take now to increase public trust in your process of expending scarce public resources on restoring our national treasure, the Chesapeake Bay Watershed. Having been deeply involved with the Program deliberations since the initial discussions of the value of Independent Evaluation, we believe that we have credibility and perspective to offer these recommendations.

We understand that there has been some resistance to the idea of external evaluation. However, we agree with those that recognize its importance and acknowledge that accountability is a critical issue right now. During our meeting discussions we often ask "Why is the bay not getting better?" It seems as though we are merely holding the line in some areas while losing ground in others. CAC believes there are three possible answers: 1) We are not doing what we say we are, 2) we are doing the wrong things, or 3) we are not doing enough. Herein lies the importance of independent evaluation as opposed to only relying on adaptive management. While we are still unsure what the Chesapeake Bay Program (Program) specifically means by adaptive management and how it will occur, the practice still implies *internal assessment* and correction of actions. These are certainly critical components to program implementation, but by its nature, internal adaptive management can inhibit new thinking, new ideas and potential innovations that could ignite an acceleration of progress that the twenty-plus years of the restoration effort honestly requires to finally meet the clean-up goals.

Analysis of Bay progress cannot be fully conducted without being able to determine whether practices are being implemented as reported. When that can be determined within a reasonable standard, then management actions can be adapted to adjust the type and volume of practices necessary to accelerate progress and more effectively utilize scarce funding. In sum, external review can identify needed improvements with a discipline and mandate that saves tax payers' money and improves program performance in the long term.

Furthermore, it is our belief that the Chesapeake Bay Program cannot afford to be seen by the public, Congress or the state legislatures as unwilling to adopt recommended measures from a well respected independent scientific body, the National Academy of Sciences (NAS), to improve its accountability through adoption of a mechanism of external review.

Jessica M. Blackburn, CAC Coordinator
P.O. Box 1981 | Richmond, VA 232178 | 804/775-0951 | 804/775-0954 (fax) | jblackburn@allianceforthebay.org

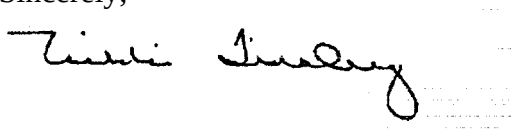
Alliance for the Chesapeake Bay

The NAS study identified some very critical actions that must be taken to allow the Program to identify how funding could be better targeted and areas that lack accountability that must be addressed in order to gain the full effect of the dollars expended on restoration activities.

The Citizens Advisory Committee recommends that the Program begin implementation of the NAS recommendations by identifying short and long term actions including directing the Program to accelerate action to implement the provision in the Regional Administrator's November 3, 2011 memo to "….bring forward through the Partnership a set of integrated recommendations for a comprehensive BMP tracking; verification and reporting system (#11).

In conclusion, we believe that the Program cannot afford to be without an independent means to evaluate its progress and urge the PSC to continue to advance the discussion on how best to institutionalize independent, external evaluation of the Bay Program. We offer our assistance in whatever way best serves the Partnership's efforts in this matter.

Sincerely,



Nikki L. Tinsley
Chair, Citizens Advisory Committee

CC: Nick DiPasquale

Citizens Advisory Committee
TO THE CHESAPEAKE EXECUTIVE COUNCIL

December 17, 2012

Nick DiPasquale
Director, Chesapeake Bay Program
Environmental Protection Agency
410 Severn Ave
Suite 109
Annapolis, MD 21403

Dear Mr. DiPasquale,

The Citizens Advisory Committee heard a presentation from Mark Dubin on the Agriculture Workgroup's verification efforts at our quarterly meeting on November 30, 2012. We have also received a copy of the letter sent by several members of the workgroup; reviewed the principles adopted by the BMP Verification Committee; and considered recent correspondence from Rich Batiuk to the chairs of the source sector workgroups.

It is our understanding that this current verification process looks to fundamentally change, for the better, the way in which the CBP verifies the implementation of practices designed to reduce nutrient and sediment pollution. In this way, the CBP will significantly improve the accounting for reductions in the Watershed Model.

What remains unclear to us is the "who" and the "how" of the final decisions on any verification protocols. To have such decisions made by the PSC may not be prudent, given the state partners' repeated cries of inadequate funds and repeated defense of existing evaluative practices. EPA must strengthen its role in providing guidance, direction and feedback on the level of verification it anticipates as sufficient to meet the reasonable assurance standard. Currently, it remains unclear exactly who will determine the sufficiency of any proposed verification protocol. However, since the level of verification is directly linked to any finding of reasonable assurance, and since any credit given in the Model is directly tied to a determination of jurisdictional accomplishment of its TMDL pollution reduction goals, it is clear to us that the final decision-maker must be EPA.

The Verification Principles established by the BMP Verification Committee are broad principles crafted at the 10,000 foot level. There is a need for EPA to provide explicit implementation guidance to the source sector workgroups providing more specificity on how the Verification Principles must be utilized as they develop their

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protocols. Of particular interest to us is the need for guidance delineating what is and is not sufficient transparency as required in the "Public Confidence" principle. Absent a significant level of heightened transparency in the verification process itself and the underlying data to support any conclusions; we will not meet the public confidence standard envisioned in the principle. Also to be included in the guidance, for example, should be an EPA implementation directive establishing that the level of "scientific rigor" will necessitate relational levels of credit application in the model and that every protocol needs to recognize this "sliding scale" approach. In addition, EPA should use the findings of the BMP Verification Review Panel—the only wholly nonpolitical and scientific group engaged in the verification process—as weighted guidance in making its determination.

We also remain concerned with many specifics relating to the verification process. We have attached a list of these specifics.

1) Reliance on use of the existing state verification protocols, the status quo, is not acceptable although it appears that many on the Agriculture workgroup support this approach.
2) Different levels of credit should be given in the model for different levels of verification.
    a. As it is inevitable that achievement of a high level of certainty will prove difficult when applied to certain BMPs, the workgroup should endorse the concept of providing different levels of credit based on different levels of certainty. A sliding scale certainty/credit ratio system would allow for greater flexibility and greater accuracy.
    b. It is not possible to pass the test of public credibility or the legal scrutiny of "reasonable assurance" by adoption of a procedure that allows BMPs verified by "self-certification" to be given the same credit in the model for pollution reduction as the same practice that has been verified by more stringent measures.
    c. Verification can include technical and qualitative measures.
    d. The process for transparency must be clearly explained.
3) The new protocols must solve the problem of accounting for expired practices. How to remedy the existing situation where reductions from a BMP are included in the model after a contract period (for federal/state payment for implementation) has expired.
4) The new protocols must solve the problem of double counting of existing practices. While there is the need to count all that is implemented, it must be clear that they are not counted twice.
5) The verification concept under discussion by the Agriculture Workgroup involves a complex and not-yet transparent approach relating to "certainty"; the process for selecting any numerical certainty level must be transparent, clearly defined, and based on technically defensible information.
6) The ongoing complaint from the states that there is insufficient funding to implement new, more robust verification protocols should not be an excuse for lack of verification.
    a. Currently, the states receive Chesapeake Bay Regulatory and Accountability funding from EPA. These grants provide dollars for verification. It is unclear whether states have dollars unspent and available under these grants.

b. Additionally, implementation should, by definition, include verification. Targeting of funding to critical areas should be employed.

Lastly, verification for the most important and the least important practices appear to be receiving the same degree of focus and development. The CBP needs to target the most important practices and direct the workgroups to pay particular attention to them. We understand that bringing BMP verification to the level which satisfies the "Public Confidence" principle mentioned above, as well as addressing concerns in the National Academy of Science's evaluation will require some significant upgrading of the partnership's programs. There is a long list of BMPs and it isn't feasible to do everything at once. Therefore, it is critical to focus on those BMPs which are most important for meeting the TMDL.

We respectfully request a formal response to this letter. In order to assist you, knowing your schedule is a full one, we would be glad to receive a verbal response via a meeting among you and your staff with available members of CAC at a time convenient for you.

Sincerely,

John Dawes
Chair, Citizens Advisory Committee

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 3
CHESAPEAKE BAY PROGRAM OFFICE
410 SEVERN AVENUE
ANNAPOLIS, MD 21403

February 4, 2013

Mr. John Dawes, Chair
Citizens Advisory Committee
Chesapeake Bay Program Partnership
c/o Alliance for Chesapeake Bay
P.O. Box 1981
Richmond, Virginia23218

Dear Mr. Dawes:

Thank you and the members of the Chesapeake Bay Program Partnership's Citizens Advisory Committee (CAC) for your letter of December 17, 2012. Given the detailed nature of your letter and the important points and concerns you raised, I wanted to first respond in writing, as well as take you up on your offer for a follow up meeting with a group of CAC members. Finally, I would like to ask you for an opportunity to speak with the full membership of CAC at its February 2013 meeting.

I am responding to your letter in both my role as the Director of the Chesapeake Bay Program Office and as the chair of the Chesapeake Bay Program Partnership's Management Board. A draft of this letter was shared in advance with the members of the Partnership's BMP Verification Committee for review and comment during their January 22 conference call. Though I was not seeking their approval, I have incorporated elements of their feedback in this final letter. Given the diversity of important topics and concerns raised, I wanted to ensure I was communicating on behalf of the larger Partnership.

Within the body of this letter, I have included excerpts from your original letter, in the italicized text, followed by detailed responses to each of the points and concerns you raised. Given the critical importance of best management practice or BMP verification to the integrity of the Partnership's accountability system, I wanted to clearly communicate where the Partnership is heading in working through these many challenges, especially since there are no national examples of similar breath and complexity to serve as models.

The Citizens Advisory Committee heard a presentation from Mark Dubin on the Agriculture Workgroup's verification efforts at our quarterly meeting on November 30, 2012. We have also received a copy of the letter sent by several members of the workgroup; reviewed the principles adopted by the BMP Verification Committee; and considered recent correspondence from Rich Batiuk to the chairs of the source sector workgroups.

Thank for continuing to put a focus on verification, transparency, and accountability on your quarterly meeting agendas and follow through actions between your meetings. The CAC membership will find even more information on the Partnership's development of a basinwide

verification framework on-line through the BMP Verification Committee's web page at http://www.chesapeakebay.net/groups/group/best_management_practices_bmp_verification_committee. This web page provides links to ongoing work of the Partnership's independent BMP Verification Review Panel, as well as the latest protocols under development by the Partnership's source sector and habitat restoration workgroups.

It is our understanding that this current verification process looks to fundamentally change, for the better, the way in which the CBP verifies the implementation of practices designed to reduce nutrient and sediment pollution. In this way, the CBP will significantly improve the accounting for reductions in the Watershed Model.

I reiterate for you past statements I have made publicly that the Partnership's work on BMP verification is a foundational element that is absolutely essential to the success of the Partnership's Bay restoration efforts.

We must be fully responsive to calls by the Citizens Advisory Committee, the National Academy of Sciences, the President's Executive Order, and others to make improvements in the transparency and scientific rigor of our efforts to verify the implementation of nutrient and sediment pollutant reducing technologies, treatment techniques, and practices. BMP verification is fundamental to ensuring increased public confidence in our accounting for implementation under the 2-year milestones and estimated load reductions using the Partnership's models and other decision support tools. Our scientific experts are continuing to interpret the trends in the decades of monitored observations of water quality in local streams, larger rivers and the tidal waters throughout the watershed of the Chesapeake Bay. We must have trust that these reported practices are actually being implemented and reducing pollutant loads as we use them in explaining the observed water quality trends.

We all must view verification not as a bean counting burden, but as the means to strengthen our confidence in local implementation efforts to ensure they are designed to help land owners, municipalities, and facility managers take the actions necessary to protect their local streams and riparian habitats. We must also recognize that there are currently successful state and federal verification programs currently operating that meet high standards. Our challenge is to improve tracking and reporting programs that need verification improvement while not harming successful programs.

What remains unclear to us is the "who" and the "how" of the final decisions on any verification protocols. To have such decisions made by the PSC may not be prudent, given the state partners' repeated cries of inadequate funds and repeated defense of existing evaluative practices.

The Partnership must and will continue to be the decision makers on the development and implementation of the verification process. The jurisdictional partners, who will be principally responsible for verifying practices implemented within their portions of the watershed, must embrace effective verification. EPA will continue in its Bay TMDL accountability role and ensure each jurisdiction's verification program meets the measure of

reasonable assurance well established during the two rounds of watershed implementation plan development and evaluation.

I believe the "cries" from the states are real—state budgets are under significant pressure. State agency managers and staff want to make sure funds are used wisely given the Partnership's focus on implementation on the jurisdiction's watershed implementation plans.

Given these concerns and considerations, we have built into the decision making process the following series of checks and balances to ensure the Partnership as a whole is fully responsive to the documented calls for verification of implemented practices.

- The Citizen Advisory Committee will continue to play a critical advisory role in calling attention to where they view the Partnership has fallen short of stated expectations and prior commitments.
- The Partnership has publically committed to responding in full to the findings and recommendations of the National Academy of Science's report entitled *Achieving Nutrient and Sediment Reduction Goals in the Chesapeake Bay.*
- The Federal Partners are publically committed to carrying out the actions necessary to meet the commitments within *Executive Order 13508 Strategy for Protecting and Restoring the Chesapeake Bay Watershed.*
- The set of five BMP Verification Principles, adopted by the Principals' Staff Committee at their December 5, 2012 meeting, stand as a public commitment and as a set of clear expectations to be achieved in all aspects of our individual and collective verification efforts.
- The Partnership has established an independent BMP Verification Review Panel. The Panel is charged with responsibility for using "the verification principles as criteria for assessing the strengths and possible vulnerabilities in the state verification programs, providing written feedback and recommendations…" and to "…evaluate whether the level of verification rigor is consistent across source sectors and across all seven watershed jurisdictions."
- Within the Principals' Staff Committee, beyond the cabinet level secretaries for the seven watershed jurisdictions, and with the input of the advisory committees, EPA, its principal federal partners, and the Chesapeake Bay Commission will all be at the table. These agencies and the Commission will part of all decisions regarding verification of practice implementation, thereby, ensuring a balanced and objective review and evaluation of the Panel's recommendations and advice.
- EPA will review and approve each of the seven jurisdictions' quality assurance plans where each jurisdiction will document their verification program in detail.

The Principals' Staff Committee will be responsible for adoption of the BMP Verification Principles, approval of the initial suite of source sector and habitat specific BMP verification protocols, and approval of other key components of the overarching BMP verification framework—procedures for eliminating double counting, basinwide agreements to ensuring full access to federal cost share practice data, and procedures for the clean-up of historical BMP databases. The Principals' Staff Committee will, in response to the feedback and recommendations from the independent BMP Verification Review Panel, act to approve or

request further changes prior to approval of each watershed jurisdiction's recommended BMP verification program.

EPA will review and approve of each of the seven jurisdictions' quality assurance plans, which are required for award of their Chesapeake Bay Implementation Grants and Chesapeake Bay Regulatory and Accountability Grants. It is within these quality assurance plans where each jurisdiction will document, in detail, their verification program. As clearly described in EPA's Chesapeake Bay Grants Guidance, approval of these quality assurance plans are required for successful award and use of federal funding involving environmental data collection and evaluation activities. In the case of these grants, it's the tracking, verification, and reporting of practices, treatment and technologies which reduce nutrient and sediment pollutant loads which triggers the requirements for a quality assurance plan. EPA review will focus on whether the jurisdictions have provided reasonable assurance for ensuring the implementation of the reported practices, treatments, and technologies and supporting programmatic activities funded through these grants and the states' matching fund programs.

EPA has already started conversations with the Scientific and Technical Advisory Committee about how to put in place a long term evaluation process to ensure periodic assessment of the effectiveness of the collective verification protocols and procedures put in place. We would welcome the Citizen Advisory Committee's ideas and inputs on this topic in the coming months.

Among the options we would request you consider are:

- Making the BMP Verification Review Panel a permanent CBP Partnership mechanism for ongoing verification protocol review.

- Enhancing the membership make-up of and charge to the existing BMP expert panels sufficiently to incorporate both verification expertise and responsibility into the ongoing and future work of these panels. Currently, these expert panels deal with development, review, and recommendation adoption of new or revised BMPs. If this is done, we recognize we will need to amend the Partnership's existing *Protocol for the Development, Review, and Approval of Loading and Effectiveness Estimates for Nutrient and Sediment Controls in the Chesapeake Bay Watershed Model,* adopted by the Water Quality Goal Implementation Team on March 15, 2010, to specifically address BMP verification.

- Offering some alternative valuation mechanism for review and approval of future verification protocols and procedures not yet adopted by the Partnership through the current process underway. Given the current BMP expert panels' charges for determination of BMP efficiencies and load reduction effectiveness is different from the accounting necessary to verify BMP implementation, a different document or approach may be required.

EPA must strengthen its role in providing guidance, direction and feedback on the level of verification it anticipates as sufficient to meet the reasonable assurance standard.

EPA already is an active participant in all phases of development and decision making on the BMP verification framework, helping shape the BMP Verification Principles recently adopted by the Partnership through the Principals' Staff Committee. However, EPA cannot act unilaterally on verification—we must build the foundation for what we collectively consider as verification up through the Partnership as a whole, working closely with all who are responsible for implementation of pollution reduction actions. Otherwise, we will have no hope for making verification an integral component of program implementation and the delivery of technical and technological assistance supporting practice implementation.

EPA believes the adopted set of five BMP Verification Principles embody reasonable assurance. The challenges before all of us is to further define verification and how it will be carried out as an integral component of our long standing programs promoting implementation of technologies, treatment techniques and practices which reduce or prevent nutrient and sediment pollutant loads. EPA will stand firm in ensuring the BMP Verification Principles are upheld in spirit and in action.

Currently, it remains unclear exactly who will determine the sufficiency of any proposed verification protocol.

The Principals' Staff Committee will approve the initial suite of source sector and habitat specific BMP verification protocols. The process for future evaluation of new verification protocols and procedures has yet to be determined, as noted above, and I welcome your input on how the Partnership should proceed forward.

However, since the level of verification is directly linked to any finding of reasonable assurance, and since any credit given in the Model is directly tied to a determination of jurisdictional accomplishment of its TMDL pollution reduction goals, it is clear to us that the final decision-maker must be EPA.

EPA has clearly and frequently communicated its expectations for accountability under the Chesapeake Bay TMDL beginning in 2008. BMP verification is an integral component of accountability under the Bay TMDL.

EPA retains responsibility for ensuring full jurisdictional accountability to achievement of the nutrient and sediment load allocations embodied within the Chesapeake Bay TMDL through implementation of the jurisdictions' Watershed Implementation Plans and their 2-year milestones.

The Agency also retains responsibility for assessing reasonable assurance of the jurisdictions' verification programs through review and approval of the jurisdiction's quality assurance plans as required by the jurisdictions' Chesapeake Bay Implementation Grants and Chesapeake Bay Regulatory and Accountability Grants.

Verification is another, though extremely important, component of a larger accountability system. The Partnership and the public at large, not EPA alone, must have confidence in scientific rigor and transparency of the accountability system. Therefore, we must build this

rigor and transparency for verification up through the Partnership and out through our many partners with implementation responsibilities.

The Verification Principles established by the BMP Verification Committee are broad principles crafted at the 10,000 foot level. There is a need for EPA to provide explicit implementation guidance to the source sector workgroups providing more specificity on how the Verification Principles must be utilized as they develop their protocols.

The BMP Verification Principles were developed and adopted by the Partnership prior to final consideration of the verification protocols so that the principles would help form and drive development of the protocols. As stated previously, there is no playbook, no existing example to follow, or precedent to adhere to regarding the size and complexity of the task before us.

Through the Partnership, we are developing the necessary insights for how to frame our verification efforts as we move forward. We are building on decades of shared experience supporting widespread implementation of pollutant load reduction actions and the subsequent tracking and reporting of those actions. We are soliciting the expertise of independent experts from around the watershed and across the country to help ensure we are setting the bar appropriately and adhering to our established principles.

It would be of value to me if, when we meet, you share with me some specific examples of the concepts or details that you would suggest EPA include in the requested guidance which have not been addressed to date.

Of particular interest to us is the need for guidance delineating what is and is not sufficient transparency as required in the "Public Confidence" principle. Absent a significant level of heightened transparency in the verification process itself and the underlying data to support any conclusions; we will not meet the public confidence standard envisioned in the principle.

This is an issue on which the Citizens Advisory Committee must advise the Partnership—help us collectively define what we mean by transparency and how that transparency can be achieved. The Committee should share specific examples which can be applied across source sector and jurisdiction as is the intent behind the Partnership's adopted public confidence principle.

Also to be included in the guidance, for example, should be an EPA implementation directive establishing that the level of "scientific rigor" will necessitate relational levels of credit application in the model and that every protocol needs to recognize this "sliding scale" approach.

The Partnership has a long history of defining 'scientific rigor' by establishing panels of recognized experts and seeking independent scientific peer review to advise the partners on what stands as scientifically rigorous given the current state of knowledge and scientific understanding. As we develop and employ verification as an integral component of our varied implementation programs, the Partnership will continue to use both expert panels and

independent scientific peer reviews to help define and re-enforce scientific rigor in our shared decision making.

Building from BMP Verification Review Panel, we are considering whether the Partnership could charge the BMP expert review panels to include the review of new verification protocols and the continued adaptation of existing protocols to factor in new insights and scientific understandings and technological developments. Regardless of the final process the Partnership selects for these future evaluations, the Partnership will need to establish a new level of commitment to verification oversight and review. We must make verification an integral component of our long standing, shared decision-making on BMP definitions, estimated pollutant reduction effectiveness, tracking, reporting, and public accountability.

In addition, EPA should use the findings of the BMP Verification Review Panel—the only wholly nonpolitical and scientific group engaged in the verification process—as weighted guidance in making its determination.

The BMP Verification Review Panel was established and charged to provide the Partnership with independent findings and recommendations on the verification principles, the workgroup's verification protocols, and the jurisdictions' verification programs. In convening the Panel, the Partnership has publically committed to full consideration of the Panel's findings and recommendations at each decision point in the implementation of a rigorous, transparent system of practice verification.

The professional staff in our state, regional, and federal agencies and academic institutions, along with the many other partners represented on our technical workgroups, our goal implementation teams, and our BMP Verification Committee, have also brought important contributions and insights to this entire process. EPA and its partners will consider all the available recommendations and input from both the independent Panel and our professional staff.

We also remain concerned with many specifics relating to the verification process. We have attached a list of these specifics.

We welcome and greatly appreciate the time and attention the Citizen Advisory Committee has devoted to verification, recognizing you were one of the early and major drivers behind the efforts now underway within the Partnership. Your current and continued identification of specific concerns are critical to the ultimate success and credibility of the Partnership's verification framework.

1) Reliance on use of the existing state verification protocols, the status quo, is not acceptable although it appears that many on the Agriculture workgroup support this approach.

The five BMP Verification Principles recognize the need for changes and enhancements and the opportunity to build from existing jurisdictional tracking and reporting programs. There are state and federal programs with strong verification programs in place and working effectively in carrying out the principles. However, we recognize none of our seven jurisdictions' existing BMP tracking, verification and reporting programs, across <u>all</u>

sectors and habitats, fully achieves all five principles. The National Academy of Science's in-depth evaluation of the Partnership's existing practice accountability systems made that very clear even prior to development of the principles.

The National Academy of Science's report did also note the rigor of the jurisdictions' existing NPDES verification programs. We should not presume, a priori, that all existing programs are not operating effectively. The task before us is to ensure that each jurisdiction's comprehensive verification program, across all sectors and habitats, achieves the adopted principles.

2) Different levels of credit should be given in the model for different levels of verification.

a. As it is inevitable that achievement of a high level of certainty will prove difficult when applied to certain BMPs, the workgroup should endorse the concept of providing different levels of credit based on different levels of certainty. A sliding scale certainty/credit ratio system would allow for greater flexibility and greater accuracy.

The Partnership's two principal source sector workgroups—Urban Stormwater and Agriculture—both evaluated and then rejected recommending a sliding scale approach due to a lack of sufficient scientific data and information on which to establish such a scale.

While the Urban Stormwater Workgroup investigated the concept of a sliding scale, it could find no definitive research to define a scientifically rigorous or defensible way to quantify how the scale would actually work in practice. Any discounts associated with a sliding scale would necessarily be arbitrary. The Urban Stormwater Workgroup elected to take a more stringent approach whereby each urban BMP would have a defined expiration date, which can only be extended based upon an on-site inspection that utilizes visual indicators to determine practice function and performance.

The Agriculture Workgroup identified the need early in 2012 to research the available scientific literature and collect pertinent information from identified experts on a national basis to support the development of verification protocols and associated pollution reduction credits. This research, being conducted by Tetra Tech under the oversight of the Agriculture Workgroup, has resulted in a comprehensive synthesis of information on existing agricultural verification examples. Unfortunately, a creditable level of scientific data to support the establishment of varying pollution reduction crediting via separate verification methods and BMPs has not been identified to date. Consequently, the Agriculture Workgroup has decided not to pursue this verification protocol process originally proposed by the workgroup itself. Instead, the Agriculture Workgroup has identified an alternative verification process which establishes a minimum threshold level of data certainty across all verification methods and practices; a process which can be more adequately supported by the limited available scientific data.

b. It is not possible to pass the test of public credibility or the legal scrutiny of "reasonable assurance" by adoption of a procedure that allows BMPs verified by "self-certification" to be given the same credit in the model for pollution reduction as the same practice that has been verified by more stringent measures.

The Partnership's two principal source sector workgroups—Urban Stormwater and Agriculture—are addressing self certification in different ways, reflective of their source sector and available means for ensuring verification. I concur that self-certification, standing alone, is unlikely to meet the EPA's reasonable assurance measure. However, in combination with an effective auditing program, self-certification could be considered a viable verification protocol. Self-certification can serve as an important first step—but certainly not the final step—in the verification process for BMPs in the urban stormwater sector. The vast majority of urban BMPs are reported under legally enforceable MS4 stormwater permits or construction general permits. The Urban Stormwater Workgroup has recommended numerous oversight and sampling procedures at the local, state, and federal level to ensure the reporting is accurate and verifiable.

The current draft agricultural verification protocol being developed by the Agriculture Workgroup encompasses as many partnership-identified verification methods as possible, including self-certification. Self-certification is presently utilized by a number of federal and nationally recognized agricultural databases, including the USDA-NASS Agriculture Census, which has served in the past and currently as the basis for numerous agricultural calculations in the suite of Chesapeake Bay Program models. Rather than eliminating self-certification as a potential method for the verification of data, the Agriculture Workgroup draft agricultural verification protocol recognizes the importance and potential limitations of self certification. The draft verification protocol places the same minimum level of data confidence on self-reported data as that obtained from other methods such as field-level assessments by trained and certified professionals. Only when this same minimum level of data certainty is obtained, perhaps through independent auditing of a percentage of the practices, will any self-certified agricultural data be credited for pollutant load reductions.

c. Verification can include technical and qualitative measures.

The Partnership's two principal source sector workgroups—Urban Stormwater and Agriculture—are taking different approaches to using both technical and qualitative measures of verification.

While the Urban Stormwater Workgroup agreed in its recommended protocols that verification requires clear visual indicators to assess practice condition and performance, it also noted that many of these indicators do not currently exist. Consequently, the Urban Stormwater Workgroup has asked both its convened and future BMP expert review panels and the Chesapeake Bay Program Partnership's stormwater coordinator (Tom Schueler, Chesapeake Stormwater Network) to develop templates for such indicators as a very high priority in 2013. The Chesapeake Stormwater Network, through a separate grant, will devise visual indicators for low impact development or LID practices in the first quarter of 2013.

The present Agriculture Workgroup draft verification protocol recognizes not only the diversity of potential verification methods, but also the diversity of BMPs that are being verified. The workgroup has identified four major categories of practices including annual, structural, management plans and management practices. Each verification method is being

evaluated against each BMP category to identify where particular methods may or may not adequately attain the expected minimum level of data certainly. Structural BMPs such as a waste storage facility will require a technical engineering evaluation compared to an annual practice such as cover crops which will be qualitative. Thus, implementing a qualitative verification method would not be recommended for structural category practices, for example.

d. The process for transparency must be clearly explained.

As the Partnership collectively defines transparency within the overall verification process, including the Citizen Advisory Committee's assistance in the development of this definition, we will act to embed the specific actions and commitments within all relevant components of the basinwide BMP verification framework.

3) The new protocols must solve the problem of accounting for expired practices. How to remedy the existing situation where reductions from a BMP are included in the model after a contract period (for federal/state payment for implementation) has expired.

Each of the six source sector workgroups and habitat workgroups are actively addressing the issue of enforcing life spans for best management practices, treatment processes, and reduction technologies. One of the more notable accomplishments of the Urban Stormwater Workgroup's work on verification has been the shift from perpetual BMPs to BMPs with defined expiration dates. The expiration dates are being defined by the expert BMP review panels and range from 3 to 9 years depending on the longevity of the particular BMP. After that date, pollutant removal credits also expire, unless verifiable evidence indicates that the practice still exists, is operating as originally designed, and is being adequately maintained, all of which can only be done through an on-site inspection performed by a qualified evaluator.

The draft verification protocol being developed by the Agriculture Workgroup recognizes that BMPs being verified under permitting, regulatory, and financial incentive programs which may have inherent obligatory life spans. For example, the BMPs implemented under a financial incentive program can only obtain the required threshold of data certainty under that verification method as long as the practice is under contract. Once the contractual lifespan between the program entity and the implementing entity has expired, the associated BMPs will need to be verified into the future under alternative methods to obtain pollution reduction credits. The alternative verification method employed will require meeting the minimum level of data certainty as with any source of agricultural BMP data.

4) The new protocols must solve the problem of double counting of existing practices. While there is the need to count all that is implemented, it must be clear that they are not counted twice.

The opportunity for double counting practices is most prevalent in the agricultural sector, given producers are receiving cost share funding from state agencies, federal agencies, and non-governmental organizations. Led by the efforts of Dr. Dean Hively and Olivia

Devereux, the U.S. Geological Survey has been actively working with Natural Resources Conservation Service, the Farm Services Administration, and the lead state agricultural departments and conservation agencies across the six states to develop state-specific procedures for eliminating double counting. The state-specific procedures will be an integral component of the larger BMP verification framework presented to the Partnership's Principals' Staff Committee for review and adoption.

5) The verification concept under discussion by the Agriculture Workgroup involves a complex and not-yet transparent approach relating to "certainty"; the process for selecting any numerical certainty level must be transparent, clearly defined, and based on technically defensible information.

The verification protocol proposal currently being developed by the Agriculture Workgroup is based on the concept of applying a minimum threshold of data certainty across all verification methods and BMPs. The proposed threshold of 80 percent data certainty has been derived as a mid-point value based on the range of values identified through the workgroup commissioned research on agricultural verification by Tetra Tech. It is my understanding that the Agriculture Workgroup plans to have the completed research report serve as a key technical support element of a more extensive protocol recommendation package that will provide a more clearly and technically defined protocol. The Agriculture Workgroup has discussed having the completed verification recommendation package also include a recommendation for a transparent and technically defensible review and approval process. All of this is currently under discussion by the Agricultural Workgroup with no final decisions made by the Partnership. Incorporating effective auditing programs could be another means of providing both more transparency and certainty in all the forthcoming verification protocols. The forthcoming recommendations of the Agriculture Workgroup will be presented up through the CBP Partnership's management structure, including all three advisory committees, for review and discussion over the course of the coming winter and spring.

6) The ongoing complaint from the states that there is insufficient funding to implement new, more robust verification protocols should not be an excuse for lack of verification.

EPA agrees that funding cannot be used as an excuse for lack of verification. However, the Partnership's 'adaptive management' verification principle recognizes that funding does play a critical role in decisions on how to best structure the jurisdictions' verification programs:

> *Verification protocols will recognize existing funding and allow for reasonable levels of flexibility in the allocation or targeting of those funds. Funding shortfalls and process improvements will be identified and acted upon when feasible.*

EPA established the Chesapeake Bay Regulatory and Accountability Program (CBRAP) Grants to provide the seven watershed jurisdictions with the funds needed to establish, strengthen and expand existing BMP tracking, verification, and reporting programs among other jurisdictional regulatory and accountability programs. Within its

recently released 2013 *Chesapeake Bay Program Grant and Cooperative Agreement Guidance*, EPA took extra steps to clearly spell out that these CBRAP grants can be used to fund BMP verification programs (please see pages 13, 30, and 31 within the 2013 grant guidance document).

a. Currently, the states receive Chesapeake Bay Regulatory and Accountability funding from EPA. These grants provide dollars for verification. It is unclear whether states have dollars unspent and available under these grants.

All seven jurisdictions have some level of unspent funds under their existing and past CBRAP grant awards. EPA is actively working with each jurisdiction to ensure timely expenditure of all funds consistent with the Agency's grant guidance. EPA's 2013 *Chesapeake Bay Program Grant and Cooperative Agreement Guidance* spells out the Agency's expectations regarding past unexpended funding and actions it could take to ensure these funds are fully expended. It is the Agency's goal that each of the jurisdictions fully utilize their awarded CBRAP grant funds to make important, long lasting investments in each jurisdiction's regulatory and accountability programs and infrastructure.

b. Additionally, implementation should, by definition, include verification. Targeting of funding to critical areas should be employed.

The Partnership's 'adaptive management' verification principle acknowledges that "verification protocols will recognize existing funding and allow for reasonable levels of flexibility in the allocation or targeting of those funds." EPA's 2013 *Chesapeake Bay Program Grant and Cooperative Agreement Guidance* spells out the Agency's expectations with respect to application of EPA grant and cooperative agreement funding towards specific targeted practices and geographies.

Lastly, verification for the most important and the least important practices appear to be receiving the same degree of focus and development.

Yes, the verification protocols currently under development by the Partnership's source sector and habitat restoration workgroups are essentially 'blind' to the relative importance a jurisdiction may place on a specific practice. While the Partnership's 'sector equity' principle does not mandate 'equality' among each and every protocol, the six workgroups are looking at all practices with similar levels of scrutiny. The BMP Verification Committee, in turn, is looking across the six workgroup's proposed protocols to ensure equity across sectors and habitats.

The CBP needs to target the most important practices and direct the workgroups to pay particular attention to them. We understand that bringing BMP verification to the level which satisfies the "Public Confidence" principle mentioned above, as well as addressing concerns in the National Academy of Science's evaluation will require some significant upgrading of the partnership's programs. There is a long list of BMPs and it isn't feasible to do everything at

once. Therefore, it is critical to focus on those BMPs which are most important for meeting the TMDL.

The Citizen Advisory Committee's calls for targeting verification efforts towards the most important practices—those on which the jurisdictions are depending upon providing for the highest level of nutrient and sediment pollutant load reductions— have been strongly echoed by recommendations put forth by the BMP Verification Review Panel during their October 12, 2012 conference call and their December 6, 2012 meeting. The Panel requested specific documentation of the most frequently employed and the most pollutant reduction effective practices which the jurisdictions have committed to implement through their Phase II Watershed Implementation Plans. Chesapeake Bay Program Office staff is actively working on addressing the Panel's request for additional information and documentation.

It is a jurisdictional decision to put more or less verification emphasis on a select set of practices, treatments, or technologies, recognizing they will not receive credit for unverified practices. Based on the above described work underway by Chesapeake Bay Program Office staff, along with their continued application of tools like the Chesapeake Assessment and Scenario Tool or CAST (actively being tailored to individual jurisdictions), the jurisdictions will be well positioned to make such verification targeting decisions.

We respectfully request a formal response to this letter. In order to assist you, knowing your schedule is a full one, we would be glad to receive a verbal response via a meeting among you and your staff with available members of CAC at a time convenient for you.

Given the detailed nature of your letter and the important points and concerns you raised, I wanted to first respond in writing, than take you up on your offer for a follow up meeting with a group of CAC members. Finally, I would like to ask you for an opportunity to speak with the full membership of CAC at its February 2013 meeting.

Please extend my personal gratitude and appreciation, as well as that of the Partnership, to your members for their continued dedicated service to the restoration of the Chesapeake Bay ecosystem and its watershed. The Committee's long focus on enhancing transparency and accountability in our individual and collective restoration efforts is fully recognized by the Partnership. I forward to meeting with you.

Sincerely,

Nicholas A. DiPasquale
Director

cc. CBP Citizen Advisory Committee Members
CBP Local Government Advisory Committee Members
CBP Scientific and Technical Advisory Committee Members
CBP Management Board Members
CBP BMP Verification Review Panel Members
CBP BMP Verification Committee Members

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
CHESAPEAKE BAY PROGRAM OFFICE
410 Severn Avenue, Suite 109
Annapolis, Maryland

April 24, 2013

Dr. Frank J. Coale, Professor
Chair, CBP Agricultural Workgroup
Environmental Science and Technology
1439 Animal Science/Ag. Engineering Bldg.
University of Maryland
College Park, MD 20742

Dear Frank:

Thanks to you and Mark Dubin for your leadership efforts over the past year, working with the Partnership's Agricultural Workgroup and the larger agricultural community on developing a comprehensive set of conservation practice verification protocols. I know that investment of time by the workgroup has taken away from other important issues and challenges facing the workgroup.

As we prepare for taking the entire basinwide BMP verification framework up through the Partnership's independent BMP Verification Review Panel this fall and eventually to the Principals' Staff Committee in the early winter timeframe, we need Agricultural Workgroup to complete its work on its verification protocols by this summer. I know you are focused right now on getting the feedback requested from the Transparency Subgroup, formed by the BMP Verification Committee at its March meeting, in order to move forward with the workgroup's protocols.

There is a growing confidence and comfort level with the overall approach the Agricultural Workgroup is taking to ensuring verification for the numerous and diverse suite of conservation practices implemented by producers. There is a standing request from the BMP Verification Review Panel and the Committee to develop some working examples of application of the 80% threshold. The work underway with the Forestry Workgroup on such a working example will benefit all of the partners and their understanding of exactly what is being proposed by the Agricultural Workgroup.

The one specific set of verification protocols which members of the BMP Verification Committee have continued to express the need for further development are those within the "Management BMPs: Plans" category. I believe most of the Committee members can see the Agricultural Workgroup's recommended path forward for the annual practices, structural practices, and the management BMPs: practices categories as outlined within the Workgroup's evolving matrix. The exact path forward for verification of the management BMPs which take the form of plans is not as clear at this time.

As work proceeds forward with both developing working examples of application of the 80% threshold and further developing the supporting tools and narrative documentation, I am asking the Agricultural Workgroup to put emphasis on further thinking through verification of the category of agricultural management BMPs which take the form of plans. I recognize you need to redirect the Agricultural Workgroup's attention to a host of other priority topics and tasks, long put on hold to move the development of the verification protocols forward. Thus, could you consider forming a small group of recognized experts, drawn both from within the Agricultural Workgroup and the larger agricultural community, which would further develop verification protocols for this category of practices. If convening such a group of experts requires some resources—staff, travel support, other—please let me know so I can work to help provide such resources.

The BMP Verification Committee specifically requested the Partnership's Management Board for additional time in the BMP verification schedule, in part, to ensure the Agricultural Workgroup had the time it needed to complete its work on its verification protocols. Please use that time extension over the course of the reminder of the spring and into the summer to complete work on the full suite of verification protocols for all four categories of agricultural conservation practices.

Again, thank you for your leadership and efforts to further enhance the level of partnership confidence in the implementation and continued pollutant reduction effectiveness of agricultural conservation practices being put in place and maintained by the Bay region's thousands of producers.

Sincerely,

Richard Batiuk
CBP Partnership BMP Verification
Committee Chair

Ec: Chesapeake Bay Program BMP Verification Committee Members
Nick DiPasquale, Chesapeake Bay Program Management Board Chair

Memo: **Recommendations of the CAC workgroup on verification and transparency**

Members: **Verna Harrison, Rebecca Hanmer, Andrew Der and staff Jessica Blackburn**

To: **Citizens Advisory Committee**

Date: **May 22, 2013**

An action item of the CAC February 21-22, 2013 quarterly meeting was the formation of a CAC workgroup to continue to engage with the Chesapeake Bay Program (CBP or Program) on their work to improve verification and transparency of Best Management Practices (BMPs). The CBP has asked CAC to help the partnership define operational *transparency* and suggest how the partnership can develop protocols for *verification* that meets CAC's continued call for sufficient transparency as required in the "Public Confidence" principles of the BMP Verification Committee.

As Rebecca was part of a group that was asked to provide a definition of *"transparency"* by March 25, she and Verna collaborated on a definition of transparency which was given to the Ag Workgroup. The definition is in part III below of the outlined letter to Nick.

The focus of the draft outline of a letter below is on the issue of verification and transparency in nutrient management of agricultural practices. (See comment on Section V)

The CAC workgroup has talked with colleagues, researched literature and reports, and Rebecca Hanmer has participated in the CBP Verification Committee meetings. The workgroup held a conference call on March 26, 2013 and have exchanged many workgroup emails and phone calls over the course of the last month. On behalf of the CAC workgroup the following recommendations are brought to you as suggested responses to Nick DiPasquale's request for further information from CAC.

CAC response to request for recommendations on BMP Verification and Transparency
DRAFT OUTLINE

I. Introduction

A. Previous exchanges on Verification- reference Dec 17, 2012 CAC letter listing concerns with verification process:
"Of particular interest to us is the need for guidance delineating what is and is not sufficient transparency as required in the "public Confidence' principle. Absent a significant level of heightened transparency in the verification process itself and the underlying data to support any conclusions; we will not meet the public confidence standard envisioned by the principle"

B. Nick's Transparency request to CAC- reference Feb 4, 2013 CBP letter to CAC in response to verification concerns and the request to ask CAC help with transparency: "This is an issue on which the Citizens Advisory Committee must advise the Partnership- help us collectively define what we mean by transparency and how that transparency can be achieved. The Committee should share specific examples which can be applied across source sector and jurisdiction as is the intent behind the Partnership's adopted public confidence principle."

II. Basic definition of "transparency"- answering the specific request from CBP, Given to the Agricultural Workgroup by Rebecca Hanmer

Transparency means operating in a way that is easy for others to see what actions are performed. Thus, when applied to government programs, transparency is a method where decision-making is carried out in a manner readily accessible to the public. Absent a legal constraint, all draft documents, work products, and final decisions or documents, and the decision making process itself, are made public and remain publicly available. Transparency means an outside reviewer can determine what data were used as a basis for a deliberative decision or conclusion to generate a report. Included would be how the data were obtained, what measures are employed to ensure the data is accurate, who is responsible for data generation and collection as well as who is responsible for ensuring data accuracy, and the methods of analysis utilized.

III. Acknowledgment of decision to create special task force

Welcome recent progress in creating a small "Plan Assessment" workgroup of technical experts to develop quantifiable verification protocol approaches for on-farm application of fertilizer, manure, and bio-solids. CAC's recommendations for what this special group should look in last section of this memo.

IV. Target practices in WIPs

We recognize that states face many challenges in strengthening verification and transparency for all the BMPs in the WIPs. Therefore, support giving highest priority to making the necessary investments in verification/transparency for those practices which are most significant in the state WIPs in terms of effectiveness and the extent to which state is depending on implementation of these practices to achieve the nutrient and sediment TMDL allocations.

V. Why focus on nonpoint source agricultural nutrient management

CAC's greatest concern is about the current problems with verification and transparency for agricultural nonpoint sources of nutrients and sediment because of the importance these practices have in achieving the WIP requirements. Although we recognize that there are legal limitations for reporting farm-specific information for BMPs supported under the Farm Bill, and there are practical limitations associated with gathering and reporting information when BMPs are implemented voluntarily, CAC believes that the general standard of transparency for nonpoint sources should be the same as for point sources. (Even for point sources, the NPDES regulations recognize distinctions in reporting between major and minor sources, and protect confidential business

information.) We also recognize that generally the agricultural management practices are the most cost-effective practices which underscore the importance of verifying them.

A. **Adaptive Management, a guiding principle of the Bay program, must be employed to address findings from both the extensive external review by the National Academy of Sciences and the USDA's Conservation Effects Assessment Project (CEAP) report.** These reports describe serious flaws in the ability to account and verify implementation of nutrient management plans.

For example, only 9% of cropped acres met the criteria for *both* phosphorus and nitrogen management, if rate, form, time and method of application are considered (CEAP 2011). Results indicate, for example, that only 35% of cropped acres met criteria for application rate for nitrogen and 37% for phosphorus and for "manured" acres only, these percentages drop to 30% and 19%, respectively. These results are in contrast to the high rates of nutrient management implementation reported by the Bay jurisdictions.

The CEAP report (Nov 2012) finds that despite improvements in nitrogen application rates, about 66% of corn acreage does not achieve the rate, timing, and method criteria that minimize environmental losses of nitrogen. As a result, improved nitrogen management on cropland continues to be a major conservation policy goal." In sum, there are significant differences between reported progress from the Bay model and that reported by farmers themselves via the CEAP process.

B. **Make the verification process and aggregate analyses of the fate of manure available to ensure transparency.** For the purposes of this discussion, the onus is not on the individual farmers to do more than either their permit or their nutrient management plan requires. We are not interested in farm-by-farm information that is protected by the Farm Bill, but we do think aggregate information should be reviewed by a third party, like EPA or USGS to compare with real world modeling data and analyze water quality implications. The review process and results are aggregated at the county level (at a minimum) and should be made available.

There is also the need to know where manure goes as many animal producers do not have land on which it can be appropriately spread. Clean Water Act permitted farms, like CAFOs, are required to have permits for how manure will be handled on the farm's land (although many of these permits have yet to be issued). If a CAFO transports manure from its farm to a non-CAFO farm, then there is no account (chain of custody) of where the manure goes or if it is applied to an area that is already too nutrient rich. A better understanding of the fate of manure will help Bay Program modelers to determine where manure can be spread and whether there is enough appropriate land available for manure application in a region of the watershed.

C. **The status quo, where there is very limited to almost non-existent transparency for agricultural nonpoint source information, cannot be allowed to continue.** Where state nonpoint source verification protocols cannot achieve the same level of transparency as their protocols for point sources of a similar size, states should document what measures

they are taking to improve transparency, such as third-party verification. There are some critical questions a state should be able to answer as a way to verify this aspect of nutrient management plans are providing the pollution protection intended.

This third party verification team should seek to answer:

1. Where are the organic and inorganic fertilizers and bio-solids going to be applied?
2. Based on a soil test prior to application, how much nitrogen and phosphorus is currently in the soil? How much fertilizer is being applied and how is it documented?
3. When is the fertilizer applied?
4. If manure is being transported out of state, where is it being applied?

VI. Extensive transparency is built-into point sources, but some improvements can be made

Also recognize that the Clean Water Act and the implementing regulations for the National Pollutant Discharge Elimination System (NPDES) contain extensive transparency requirements. CAC supports the general position that the states should use the legally-established NPDES verification and transparency mechanisms for those nutrient and sediment sources which are regulated as "point sources". However, practical limitations on transparency need to be corrected. The MS4 process would lend itself to even better transparency as the annual reporting requirements are already in the public domain and efforts to makes them more available and understandable would have a lot more return on the effort investment.

Address backlog of permits- Where NPDES permits with the appropriate Chesapeake Bay TMDL-related requirements have not been completed, then transparency is lacking because the necessary monitoring and reporting are not being done. In particular:

A. Jurisdictions should make sure that all sewage treatment plant NPDES permits contain the necessary nutrient limits, monitoring and reporting requirements. We understand that some "significant" treatment plants still lack numerical nutrient limits years after the Bay permitting strategy was issued.

B. Jurisdictions should expedite improvements to NPDES stormwater permitting and implementation, especially by reissuing Phase I MS4 permits and issuing Phase 2 MS4 permits which contain the necessary requirements for achieving the Bay WIP requirements. In addition, EPA should enhance transparency by reconsidering its characterization of all stormwater permits as "minors", thus limiting electronic reporting of MS4 information (ICIS system).

VII. Current approach by the verification committees- Tetra Tech method

The Agriculture Workgroup has sponsored development of a verification assessment tool by consultant Tetra Tech (Tt method), in lieu of drafting BMP-specific protocols. Although the Tt method may have potential, in its current state it is decreasing rather than adding to transparency. One of our CAC team, Rebecca Hanmer, participated in the only

practical trial of the method of which we have been informed, for the draft riparian forest buffer (RFB) protocol. Although the method provoked useful discussion, it was complex and very time-consuming to employ. It should not be called a numerical scoring method at all as it relies on the professional judgment of the evaluation teams whose composition is currently unknown.

VIII. Problems with the current approach (1)- test the method with independent experts

We object to providing this method to the jurisdictions for use in its present form. There should be several more Bay Program-level trials of different types of BMP protocols, using teams who are expert in the selected BMPs but also including some members who are independent of the current agricultural assistance establishment. The results of these trials need to be written up and made publicly available for discussion (e.g. by the BMP Verification Committee).

Problems with the current approach (2)- use plain English, not codes and insider references

Even with better, more user-friendly guidance, application of the method could still be non-transparent. Because the method depends upon team scoring, the composition of the teams is of prime importance. State scoring teams should also include independent experts. Results of team scoring need to be written up and submitted to the Bay Program along with the BMP verification protocols, with clear information about how potential weaknesses were addressed. The BMP protocols themselves must be written out in plain English, not simply keyed to the spreadsheet which the Agriculture Workgroup has developed.

IX. Conclusion

Lastly, CAC is committed to preserving healthy agriculture in our communities. Rural landscapes are integral to the fabric of our region's culture. Just as clean water is important to healthy communities, so are healthy, local food sources. We believe responsible agricultural practices are good land uses. The states led the design of their WIPs to accommodate agricultural viability and should also be accountable for the responsible farming practices that seek to credit towards the WIPs congruent with urban stormwater verification requirements. We encourage the EPA to use the Chesapeake Bay Program as a venue to promote and share successful examples across the watershed that demonstrate healthy farm practices, the community ethos that support them and the mechanisms that promote practice verification.

Citizens Advisory Committee
TO THE CHESAPEAKE EXECUTIVE COUNCIL

Nick DiPasquale
Director, EPA Chesapeake Bay Program
410 Severn Ave
Suite 109
Annapolis, MD 21403

July 25, 2013

Dear Nick,

The Citizens Advisory Committee (CAC) commends the EPA and the other Chesapeake Bay Program (Program) partners for embarking on a process to review and verify the protocols used to evaluate the implementation of best management practices.

As stated in our letter to you on December 17, 2012, CAC sees the need for robust and practicable procedures relating to both "transparency" and "verification."

> "Of particular interest to us is the need for guidance delineating what is and is not sufficient transparency as required in the "public confidence" principle. Absent a significant level of heightened transparency in the verification process itself and the underlying data to support any conclusions; we will not meet the public confidence standard envisioned by the principle".

On February 4, 2013 the Program responded in a letter to CAC and requested CAC to help with defining operational transparency:

> "This is an issue on which the Citizens Advisory Committee must advise the Partnership- help us collectively define what we mean by transparency and how that transparency can be achieved. The Committee should share specific examples which can be applied across source sector and jurisdiction as is the intent behind the Partnership's adopted public confidence principle."

CAC member, Rebecca Hanmer has been participating on the Verification Committee and provided feedback on behalf of Citizens Advisory Committee.

The focus of this correspondence will be on the relationship between "transparency" and "verification" - with initial emphasis on agricultural non-point sources of nutrients and sediments because of the importance of these practices for achieving Watershed Implementation Plan (WIP) requirements. We recognize there are in some instances, legal limitations for reporting some farm-specific information. Although there may be some practical limitations associated with gathering and reporting information on BMPs

implemented voluntarily, the BMP Verification Committee's principle re: "sector equity" dictates giving attention to agricultural verification protocols that provide the same level of transparency that occurs with, for example, urban and suburban stormwater. Currently, this does not exist.

For example, several of the jurisdictions reported significant pounds of nutrient pollution reduction based on implementation of management plans. However, in contrast to the high rates of reported nutrient management plan implementation, the 2011 CEAP Report* found that only 9% of cropped acres met the criteria for both phosphorus and nitrogen management, when rate, form, time, and method of application were considered. Results indicate, for example, that only 35% of cropped acres met criteria for application rate for nitrogen and 37% for phosphorus. For "manured" acres only, these percentages drop to 30% and 19% respectively. The CEAP report concluded that despite improvements in nutrient application rates, about 66% of corn acreage does not achieve the rate, timing, and method criteria that minimize environmental losses of nutrients. As a result, improved nutrient management on cropland and verification of that improvement continues to be a major conservation policy goal.

In sum, there are significant differences between reported progress provided by the jurisdictions and that reported by farmers themselves via the CEAP process. Only a transparent verification protocol that includes the recommendations below can resolve these differences.

Recommendations:

(1) Technical assistance: CAC supports the decision to create a workgroup to "dive deeply" into making recommendations for verification protocols for nutrient management plans to ensure transparency of on-farm application of fertilizer, manure and bio-solids. We respectfully ask that you consider the suggested candidates for workgroup appointment that we have listed in the attachment.

(2) Targeting: We recognize that the jurisdictions and Program face many challenges in strengthening verification and transparency. However, changes are essential to solving the current problems with insufficient verification. Targeting of those practices and geographic areas based on the geographic location of the greatest agricultural loadings should be a significant component of WIP reporting. In sum, targeted implementation frees up funding for verification.

(3) Third party analysis: Protocols should require review of any aggregate information by a third party as well as a comparison between the aggregated information and real world modeling data (to analyze water quality implications).

(4) Tracking: There is a basic need to track where manure goes. Many producers have insufficient land for environmentally responsible use of the manure.** Even when there is a permit to guide the handling of manure on a farm, too often once transport of the manure off the farm occurs, there is no accounting (chain of custody) of where the manure goes. A clear and transparent accounting of the fate of the manure will not only have water quality benefits but can also help promote market based solutions that can provide farmer income from alternative off-farm uses.

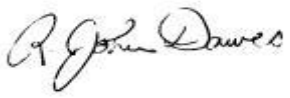
(5) Model: If there are to be any early model revisions related to non-point source provisions, they should be accompanied by actions to ensure that other important issues are addressed. For example, phosphorus soil saturation should be taken into account and nutrient reduction credits should only be given when a CAFO permit is implemented, not merely applied for or issued.

(6) Public understanding: Transparency is an essential element of public understanding and acceptance of any verification program and protocol. The Program needs to ensure that any protocol and any assessment of the protocol can be clearly understood by the public.

In conclusion, we note that several of these recommendations are included in the EPA "Interim Assessment of 2012-13 Milestones and WIP Progress" and look forward to seeing them reflected in the next WIPs issued by the jurisdictions.

Lastly, CAC is committed to preserving healthy and sustainable agriculture in our communities. Rural landscapes are integral to the fabric of our region's culture. Just as clean water is important to healthy communities, so are healthy local food sources. We believe responsible agricultural practices that seek credit towards the WIPs are as congruent as possible with urban stormwater verification requirements. We encourage the EPA to use the Chesapeake Bay Program as a venue to promote and share successful examples across the watershed that demonstrate healthy farm practices, the community ethos that support them, and the mechanisms that promote verification.

Sincerely,



R. John Dawes
Chair, Citizens Advisory Committee

cc: Rich Batiuk, Associate Director for Science, Analysis and Implementation, EPA Chesapeake Bay Program

Enclosure: List of candidates that might be invited to participate on a workgroup

*Assessment of the Effects of Conservation Practices on Cultivated Cropland in the Chesapeake Bay Region; Conservation Effects Assessment Project (CEAP), USDA Natural Resources Conservation Services, February 2011

** Note we have learned of a producer who opted to remove 200 acres of trees from the farm in order to have enough land to spread on-site manure.

Appendix T. CAC BMP Verification Related Correspondence

List of candidates that might be invited to participate on a workgroup
Verification group - land application of manure as part of Nutrient Management Plans
(It should be noted that they have not been contacted)

Jeffery Allenby
Conservation Planner
Chesapeake Conservancy, Inc.
jallenby@chesapeakeconservancy.org

Jim Baird
Mid-Atlantic Director
American Farmland Trust
jbaird@farmland.org

David Burke
President, Burke Environmental Associates
dgburke@verizon.net

John Dawes, Jr.
Administrator
Chesapeake Commons
dawes@heinzcenter.org

Olivia Devereux
Devereux Consulting, Inc.
olivia@devereuxconsulting.com

Craig Cox
Environmental Working Group
craig@ewg.org

Matt Ehrhart
Director of Watershed Restoration
Stroud Research Center
mehrhart@stroudcenter.org

Stephen Harper
Global Director, Environment and Energy Policy
Intel Corporation
Stephen.harper@intel.com

Dean Hively
Department of Geographical Sciences
University of Maryland
whively@usgs.gov

Jeff Kelble
Shenandoah Riverkeeper
Riverkeeper@shenandoahriverkeeper.org

Jacob Powel
Policy and Campaigns Manager
VA Conservation Network
jacob@vcna.org

David Rejeski
Director, Science & Technology Innovation Program
Woodrow Wilson International Center for Scholars
david.rejeski@wilsoncenter.org

Kelly Shenk
Nutrient Coordinator
EPA Chesapeake Bay Program
Shenk.Kelly@epa.gov

Tom Simpson
President, Water Stewardship, Inc.
toms@waterstewardshipinc.org

Paul Spies
Conservation Planner
Chester River Association
pspies@chesterriverassociation.org

Trish Steinhilber
Agriculture Nutrient Management Program
College of Agriculture and Natural Resources
University of Maryland
psteinhi@umd.edu

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 3
CHESAPEAKE BAY PROGRAM OFFICE
410 SEVERN AVENUE
ANNAPOLIS, MD 21403

August 8, 2013

Mr. John Dawes, Chair
Citizens Advisory Committee
Chesapeake Bay Program Partnership
c/o Alliance for Chesapeake Bay
P.O. Box 1981
Richmond, Virginia 23218

Dear Mr. Dawes:

Thank you and the members of the Chesapeake Bay Program Partnership's Citizens Advisory Committee (CAC) for your letter of July 25, 2013 and for keeping the Partnership's focus on verification, transparency, and accountability. I wanted to first respond in writing to the points and concerns the Committee is raising to keep this open dialogue and issue resolution moving forward. I would then ask you for an opportunity for Rich Batiuk and I to speak with the full membership of CAC at its November 2013 meeting.

I am responding to your letter in both my role as the Director of the Chesapeake Bay Program Office and as the chair of the Chesapeake Bay Program Partnership's Management Board. Within the body of this letter, I have included excerpts from your original letter, in the italicized text, followed by detailed responses to each of the points and concerns you raised.

As stated in our letter to you on December 17, 2012, CAC sees the need for robust and practicable procedures relating to both "transparency" and "verification."

> *"Of particular interest to us is the need for guidance delineating what is and is not sufficient transparency as required in the "public confidence" principle. Absent a significant level of heightened transparency in the verification process itself and the underlying data to support any conclusions; we will not meet the public confidence standard envisioned by the principle".*

Again, thank you and your Committee members for continuing to raise these critical pillars of a strong ecosystem restoration directed partnership. We must achieve a strong measure of both if we ultimately to be successful in restoring the Chesapeake Bay ecosystem and its surrounding, support watershed. Please continue to communicate clearly and often on your expectations until the Partnership has hit the mark.

On February 4, 2013 the Program responded in a letter to CAC and requested CAC to help with defining operational transparency:

> *"This is an issue on which the Citizens Advisory Committee must advise the Partnership- help us collectively define what we mean by transparency and how that transparency can be achieved. The Committee should share specific examples which can be applied across source sector and jurisdiction as is the intent behind the Partnership's adopted public confidence principle."*

CAC member, Rebecca Hanmer has been participating on the Verification Committee and provided feedback on behalf of Citizens Advisory Committee.

In response to my letter and my request to the Committee, the members rose to the challenge and delivered, thanks to the special efforts of Rebecca Hanmer and Verna Harrison. I want to particularly recognize Rebecca for going well beyond the call of duty. Not only has she continued in her leadership position within the Partnership as chair of the Forestry Workgroup (reminding us trees are the solution to Bay restoration; a point on which I totally agree!) and her membership on the Citizen Advisory Committee (CAC), but she accepted an appointment to the Partnership's independent BMP Verification Review Panel, joining experts drawn from across the country. And then Rebecca accepted an invitation to participate on a subgroup of the BMP Verification Committee to hammer out an agreement on addressing transparency, a request from both the CAC and the Agriculture Workgroup. Her decades as a federal regulator, her experience as the director of the Chesapeake Bay Program, and her passion for the environment have positioned her well to help guide the Partnership along this road.

The focus of this correspondence will be on the relationship between "transparency" and "verification" - with initial emphasis on agricultural non-point sources of nutrients and sediments because of the importance of these practices for achieving Watershed Implementation Plan (WIP) requirements. We recognize there are in some instances, legal limitations for reporting some farm-specific information. Although there may be some practical limitations associated with gathering and reporting information on BMPs implemented voluntarily, the BMP Verification Committee's principle re: "sector equity" dictates giving attention to agricultural verification protocols that provide the same level of transparency that occurs with, for example, urban and suburban stormwater. Currently, this does not exist.

The BMP Verification Committee's Transparency Subgroup has drafted up recommended language, provided as an attachment to this letter, for a proposed sixth BMP verification principle for consideration and adoption by the CBP Partnership. Based on further input from the Partnership's Agriculture Workgroup, there are currently two sets of language up for consideration by the Partnership, indicated in the boldface text within the one page attachment to this letter. Even though the immediate focus has been placed on addressing a request for transparency guidance from the Agriculture Workgroup, the recommended language and, ultimately, the transparency principle, if adopted by the Partnership, would apply across <u>all</u> source sectors and the entire verification process.

This recommended language, along with the larger issue of ensuring transparency, has been brought forward to the Partnership's BMP Verification Review Panel. The Panel heard a briefing by Mark Dubin, CBP Agriculture Workgroup Coordinator, and Roy Hoagland, BMP Verification Committee and Transparency Subgroup member, on the Subgroup's deliberations and proposed transparency principle language at the Panel's July 31 conference call. The Panel will be discussing the need for transparency in greater detail at its August 28-29 meeting in Annapolis.

The Panel's specific feedback on the recommended language, along with their recommendations on addressing transparency, will be forwarded to the BMP Verification Committee for consideration at the Committee's September 16 meeting. From there, both the Panel's and the Committee's recommendations will be worked up through the Partnership's management structure, first through the Goal Implementation Teams, then the Advisory Committees, followed by the Management Board, and then onto the Principals' Staff Committee for final decisions. I believe this process in the coming months will ensure a full airing of ideas, concerns, and recommendations for ensuring we are both clearly defining transparency and fully describing expectations for ensuring it is carried out as a routine part of the business of restoring and protecting the Bay and its watershed.

For example, several of the jurisdictions reported significant pounds of nutrient pollution reduction based on implementation of management plans. However, in contrast to the high rates of reported nutrient management plan implementation, the 2011 CEAP Report found that only 9% of cropped acres met the criteria for both phosphorus and nitrogen management, when rate, form, time, and method of application were considered. Results indicate, for example, that only 35% of cropped acres met criteria for application rate for nitrogen and 37% for phosphorus. For "manured" acres only, these percentages drop to 30% and 19% respectively. The CEAP report concluded that despite improvements in nutrient application rates, about 66% of corn acreage does not achieve the rate, timing, and method criteria that minimize environmental losses of nutrients. As a result, improved nutrient management on cropland and verification of that improvement continues to be a major conservation policy goal.*

In sum, there are significant differences between reported progress provided by the jurisdictions and that reported by farmers themselves via the CEAP process. Only a transparent verification protocol that includes the recommendations below can resolve these differences.

Recommendations:
(1) Technical assistance: CAC supports the decision to create a workgroup to "dive deeply" into making recommendations for verification protocols for nutrient management plans to ensure transparency of on-farm application of fertilizer, manure and bio-solids. We respectfully ask that you consider the suggested candidates for workgroup appointment that we have listed in the attachment.

The CEAP report you reference provided clear evidence to the Partnership that more must be done to both verify management practices being reported as practices and change the delivery of technical support to the watershed's thousands of producers. As long called for by your own member, Verna Harrison, and the subject of an April 24, 2103 letter from Rich Batiuk, Chair,

CBP Verification Committee to Frank Coale, Chair, CBP Agriculture Workgroup (see the second attachment to this letter), the Agriculture Workgroup is convening a group to develop verification protocols for agricultural conservation practices implemented as management plans (e.g., nutrient management plans). Rich Batiuk has been working closely with Verna Harrison, Frank Coale, and Mark Dubin to ensure the membership on the group includes some of the suggested candidates put forth in your letter. Once the Agriculture Workgroup has finalized the membership, charge, and schedule for the work of this group, I will pass that information along to you. Thanks to Verna's steadfast efforts, this issue to coming to the forefront of the Partnership for long overdue discussion and resolution.

(2) Targeting: We recognize that the jurisdictions and Program face many challenges in strengthening verification and transparency. However, changes are essential to solving the current problems with insufficient verification. Targeting of those practices and geographic areas based on the geographic location of the greatest agricultural loadings should be a significant component of WIP reporting. In sum, targeted implementation frees up funding for verification.

EPA, our federal partners, particularly NRCS and USGS, and our jurisdictional partners have mutually developed tools and maps and have agreed on specific areas within the Chesapeake Bay watershed which have the greatest agricultural loading contributions to the downstream tidal waters. Those identified priority areas are used in geographically focusing federal cost-share and monitoring resources. EPA's 2013 grant guidance[1], directed to the watershed jurisdictions and recipients of the Partnership's Small Watershed and Innovative Nutrient and Sediment Reduction (INSR) grants, addresses practices and strategies on pages 22-25, including the below language:

> "Consistent with the EO 13508 Strategy, recipients of Chesapeake Bay Implementation grants (CBIG), Headwater grants, and Chesapeake Bay Regulatory and Accountability Program (CBRAP) grants must give preference to priority practices, watersheds, and strategies in their work plans that will result in the greatest benefits to water quality in the Bay. This focus is consistent with the CBP's ongoing efforts to use the most accurate and appropriate science to identify priority practices, watersheds, and activities."

Based on direct feedback and recommendations from the Partnership's BMP Verification Review Panel, Chesapeake Bay Program Office staff conducted in-depth evaluations of the nutrient and sediment reduction effectiveness of more than 60 different BMPs adopted by the Partnership in the context of practice implementation levels described in the jurisdictions' Phase II Watershed Implementation Plans. The findings from this extensive set of evaluations were presented to the Panel at its June 19 conference call[2]. The Panel is expected to recommend the targeting of verification efforts towards those practices which will provide for the vast majority of the planned nutrient and sediment pollutant load reductions.

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[1] CBP 2013 grant guidance is accessible online at http://www.epa.gov/region03/chesapeake/grants.htm.

[2] The briefing presentation to the CBP Partnership's BMP Verification Review Panel is accessible on-line at http://www.chesapeakebay.net/S=0/calendar/event/19542/.

(3) Third party analysis: Protocols should require review of any aggregate information by a third party as well as a comparison between the aggregated information and real world modeling data (to analyze water quality implications).

I would appreciate hearing more details about what you specifically have in mind with this recommendation—some clear, working examples would be greatly appreciated—before responding in more detail to this recommendation. I will then work to ensure further discussion within the Partnership, particularly within the BP Verification Review Panel and the BMP Verification Committee as well, as I don't believe this specific topic has come up.

*(4) Tracking: There is a basic need to track where manure goes. Many producers have insufficient land for environmentally responsible use of the manure.** Even when there is a permit to guide the handling of manure on a farm, too often once transport of the manure off the farm occurs, there is no accounting (chain of custody) of where the manure goes. A clear and transparent accounting of the fate of the manure will not only have water quality benefits but can also help promote market based solutions that can provide farmer income from alternative off-farm uses.*

I completely agree with the need for better tracking and accounting of manure use and transport. I recommend we ensure the two groups currently active within the Partnership—the Agriculture Workgroup's Nutrient Management Expert Panel and the conservation practices implemented as management plans verification group—tackle this need from their two different charges. I will reach out to Frank Coale and ask the Agriculture Workgroup to take on this responsibility immediately.

(5) Model: If there are to be any early model revisions related to non-point source provisions, they should be accompanied by actions to ensure that other important issues are addressed. For example, phosphorus soil saturation should be taken into account and nutrient reduction credits should only be given when a CAFO permit is implemented, not merely applied for or issued.

Partnership work addressing this recommendation is proceeding down two paths. Some of the issues can be addressed through the existing and planned BMP expert panels being supported and convened under the Partnership's technical workgroups—e.g., the Agriculture Workgroup's Nutrient Management Plans BMP Expert Panel chaired by Chris Brosch, Virginia Tech. Other issues will need to be addressed during the Partnership's development of the Phase 6 Chesapeake Bay Watershed Model. Under the leadership of the Land Use Workgroup, co-chaired by Jenny Tribo, Hampton Road Planning District Commission, and Karl Berger, Metropolitan Washington Council of Governments, work is underway to re-work the land uses and their respective pollutant loading rates through a workshop and then an expert panel. The Partnership's source sector workgroups—Agriculture, Urban Stormwater, Forestry, and Wastewater—and the Watershed Technical Workgroup will be collaborating with the Land Use Workgroup on resolving the issues you reference to above.

(6) Public understanding: Transparency is an essential element of public understanding and acceptance of any verification program and protocol. The Program needs to ensure that any protocol and any assessment of the protocol can be clearly understood by the public.

I ask the CAC to carefully consider the recommended transparency BMP verification principle language provided in the first attachment to this letter as the starting point for reaching Partnership agreement on what we mean by transparency. Please provide your collective feedback over the coming weeks and months so that what is recommended to the Principals' Staff Committee this winter reflects your input. Then I ask the CAC to keep focused on transparency and work with the rest of the Partnership on how we carry out what we have committed to do. We need your continued independent voice and advice as we proceed forward with implementation of the basinwide BMP verification framework across all seven watershed jurisdictions and all source sectors.

In conclusion, we note that several of these recommendations are included in the EPA "Interim Assessment of 2012-13 Milestones and WIP Progress" and look forward to seeing them reflected in the next WIPs issued by the jurisdictions.

That is exactly one of the intended purposes of EPA's assessment of the jurisdictions' milestones and WIP progress—providing clear, advance signals of forthcoming expectations. EPA has assigned a senior manager as well as a lead staffer to work closely with each of the seven watershed jurisdictions on their work toward implementing their watershed implementation plans and achieving their milestones. We are actively using a combination of regularly scheduled quarterly meetings/conference calls along with our interim and final milestone assessments to keep in close communication with our jurisdictional partners.

Lastly, CAC is committed to preserving healthy and sustainable agriculture in our communities. Rural landscapes are integral to the fabric of our region's culture. Just as clean water is important to healthy communities, so are healthy local food sources. We believe responsible agricultural practices that seek credit towards the WIPs are as congruent as possible with urban stormwater verification requirements. We encourage the EPA to use the Chesapeake Bay Program as a venue to promote and share successful examples across the watershed that demonstrate healthy farm practices, the community ethos that support them, and the mechanisms that promote verification.

Not only does our best available science indicate that well-managed agricultural lands are the best land use for ensuring protection of local water quality and stream biological communities next to forest lands, the open-space and scenic vistas provided by our agricultural lands are an integral part of why the mid-Atlantic region is such a special place to live and raise our families. The Partnership is actively taking on the charge you outline above, althoughwe clearly have more work to do and still face challenges to overcome; but we know what we need to do. We must sustain our agricultural lands and those working those lands as they are key to restoring our local streams and our treasured Chesapeake Bay watershed.

The Committee's continued focus on enhancing transparency and accountability in our individual and collective restoration efforts is fully recognized by the Partnership. Thank you for taking up and acting on the challenges I put forth in my February 2013 letter and helping point the way on transparency. Please extend my personal gratitude and appreciation, as well as that of the Partnership, to your members for their continued dedicated service to the restoration of the Chesapeake Bay ecosystem and its watershed.

Sincerely,

Nicholas A. DiPasquale
Director

Attachments

cc. CBP Citizen Advisory Committee Members
CBP Local Government Advisory Committee Members
CBP Scientific and Technical Advisory Committee Members
CBP Management Board Members
CBP BMP Verification Review Panel Members
CBP BMP Verification Committee Members

Attachment 1

Chesapeake Bay Program Partnership
BMP Verification Committee
Ad Hoc Transparency Subgroup
July 11, 2013/June 12, 2013 Versions

Background
The Agriculture Workgroup sought guidance on a particular aspect of the BMP Verification Principles – transparency – described in Principle 3, Public Confidence:

> Verification protocols incorporate transparency in both the processes of verification and tracking and reporting of the underlying data. Levels of transparency will vary depending upon source sector, acknowledging existing legal limitations and the need to respect individual confidentiality to ensure access to non-cost shared practice data.

Transparency is incorporated in the Clean Water Act (CWA), and its regulatory and policy framework, which establishes public access and site-specific data transparency requirements for all sources of nutrients and sediments regulated as point sources. The following definition and recommendations are proposed to clarify the concept of transparency across all nonpoint sources.

Proposed Addendum to the BMP Verification Principles[3]: Transparency

Definition of transparency
Transparency means operating in a way so any outside reviewer can determine what actions were taken, which data were synthesized to generate a report or conclusion, how data was collected and obtained, what measures were employed to ensure data accuracy, who is responsible for data collection and synthesis, who is responsible for ensuring data accuracy, and the methods of data analysis utilized.

Recommendations

1. The measure of transparency will be applied to three primary areas of verification: data collection, data synthesis and data reporting.
2. Transparency of the process of data collection must incorporate **clearly defined/ independent** QA/QC procedures, which may be implemented by the data-collecting agency or by an independent third party.
3. Transparency of the data reported should be transparent at the **finest possible/most site-specific** scale that conforms with legal and programmatic constraints, and at a scale compatible with data input for the Chesapeake Bay Program partnership modeling tools.
4. It is recognized that transparency of data reported will vary across verification methods and data collection and reporting programs. This variance, however, should not negate the commitment and obligation to ensure transparency at the highest level possible.

[3] http://www.chesapeakebay.net/documents/Ches_Bay_Program_Partnership_BMP_Verification_Principles.pdf

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
CHESAPEAKE BAY PROGRAM OFFICE
410 Severn Avenue, Suite 109
Annapolis, Maryland

April 24, 2013

Dr. Frank J. Coale, Professor
Chair, CBP Agricultural Workgroup
Environmental Science and Technology
1439 Animal Science/Ag. Engineering Bldg.
University of Maryland
College Park, MD 20742

Dear Frank:

Thanks to you and Mark Dubin for your leadership efforts over the past year, working with the Partnership's Agricultural Workgroup and the larger agricultural community on developing a comprehensive set of conservation practice verification protocols. I know that investment of time by the workgroup has taken away from other important issues and challenges facing the workgroup.

As we prepare for taking the entire basinwide BMP verification framework up through the Partnership's independent BMP Verification Review Panel this fall and eventually to the Principals' Staff Committee in the early winter timeframe, we need Agricultural Workgroup to complete its work on its verification protocols by this summer. I know you are focused right now on getting the feedback requested from the Transparency Subgroup, formed by the BMP Verification Committee at its March meeting, in order to move forward with the workgroup's protocols.

There is a growing confidence and comfort level with the overall approach the Agricultural Workgroup is taking to ensuring verification for the numerous and diverse suite of conservation practices implemented by producers. There is a standing request from the BMP Verification Review Panel and the Committee to develop some working examples of application of the 80% threshold. The work underway with the Forestry Workgroup on such a working example will benefit all of the partners and their understanding of exactly what is being proposed by the Agricultural Workgroup.

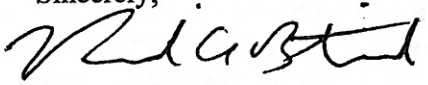
The one specific set of verification protocols which members of the BMP Verification Committee have continued to express the need for further development are those within the "Management BMPs: Plans" category. I believe most of the Committee members can see the Agricultural Workgroup's recommended path forward for the annual practices, structural practices, and the management BMPs: practices categories as outlined within the Workgroup's evolving matrix. The exact path forward for verification of the management BMPs which take the form of plans is not as clear at this time.

As work proceeds forward with both developing working examples of application of the 80% threshold and further developing the supporting tools and narrative documentation, I am asking the Agricultural Workgroup to put emphasis on further thinking through verification of the category of agricultural management BMPs which take the form of plans. I recognize you need to redirect the Agricultural Workgroup's attention to a host of other priority topics and tasks, long put on hold to move the development of the verification protocols forward. Thus, could you consider forming a small group of recognized experts, drawn both from within the Agricultural Workgroup and the larger agricultural community, which would further develop verification protocols for this category of practices. If convening such a group of experts requires some resources—staff, travel support, other—please let me know so I can work to help provide such resources.

The BMP Verification Committee specifically requested the Partnership's Management Board for additional time in the BMP verification schedule, in part, to ensure the Agricultural Workgroup had the time it needed to complete its work on its verification protocols. Please use that time extension over the course of the reminder of the spring and into the summer to complete work on the full suite of verification protocols for all four categories of agricultural conservation practices.

Again, thank you for your leadership and efforts to further enhance the level of partnership confidence in the implementation and continued pollutant reduction effectiveness of agricultural conservation practices being put in place and maintained by the Bay region's thousands of producers.

Sincerely,



Richard Batiuk
CBP Partnership BMP Verification
Committee Chair

Ec: Chesapeake Bay Program BMP Verification Committee Members
Nick DiPasquale, Chesapeake Bay Program Management Board Chair

Appendix U

Comments related to the document entitled

"6/3/2013 Draft Review by STAC BMP Verification Subgroup"

August 16, 2013

STAC BMP Verification Subgroup: Brian Benham, Russ Brinsfield, Carl Hershner, David Sample, Marc Ribaudo, Gene Yagow

Background:

In early June 2013, a six member STAC BMP Verification Subgroup (the committee) was tasked with reviewing a specific section (Partnership Process for Evaluation and Oversight) of a forthcoming draft BMP Verification Framework. On June 18, 2013 Rich Batiuk met via conference call with a portion of the committee (Benham, Sample and Yagow) and provided additional background about the on-going BMP verification planning work the CBP and the Partnership has been engaged in, and helped to clarify the charge to the committee. The members of the committee that were available had additional meetings via teleconference on June 28th, again on July 30th (again with Rich Batiuk on the call), and on August 7th to further discuss our review.

On July 15, 2013, the CBP released the draft CBP BMP Verification Framework (BMP Verification Committee, 2013). The framework was developed by the Partnership over a two-year period through their participation in various goal implementation teams (GIT) and sector-specific workgroups. In the draft framework, BMP verification is defined as

> *"the process through which agency partners ensure practices, treatments, and technologies resulting in reductions of nitrogen, phosphorus, and/or sediment pollutant loads are implemented and operating correctly."*

The framework document also states that the purpose of BMP verification is to

> *"…strengthen our [the public's] confidence in local implementation efforts to ensure they are designed to help land owners, municipalities, and facility managers take the actions necessary to protect their properties, lands, riparian habitats, and local streams."*

The BMP verification framework (BMP Verification Committee, 2013) details a set of five guiding principles (Table 1) the Partnership has committed to adhere to when developing BMP verification protocols, a few very general sector-specific BMP verification protocols, and the process by which the implementation of the BMP verification framework will be evaluated. Detailed BMP-specific protocols have yet to be developed, and under the proposed design, the detailed verification protocols will be developed by each of the Partnership's jurisdictions using guidance from the GIT's source-sector workgroups. As a result, the draft verification framework did not include any specific examples of BMP verification protocols, nor did it discuss in detail the process of implementing BMP verification.

Given the lack of detail and the absence of specific examples of verification protocols, the committee found it difficult to review and comment on the evaluation and oversight process. As result, the committee believed it necessary to provide an overarching recommendation as to how BMP verification protocols should be developed and implemented. That recommendation is provided below, and is used as reference when commenting on the proposed BMP verification evaluation and oversight process. The detailed BMP verification design suggestions offered by the committee are not unique. Many of these recommendations echo those already made to the Water Quality GIT Ag Workgroup (BMP Verification Committee, 2013; Appendix P) and those outlined in the December 17, 2012 letter from the CAC to the CBP. Overall, the committee supports the CBP goal that the BMP verification process should be focused on developing implementable verification protocols that are periodically and rigorously evaluated to ensure that jurisdiction-reported BMPs have been implemented and are performing as intended.

Table 1 Chesapeake Bay BMP Verification Principles (BMP Verification Committee, 2013)

Principle	Description
Practice Reporting	Affirms that verification is required for practices, treatments, and technologies reported for nitrogen, phosphorus, and/or sediment pollutant load reduction credit through the CBP partnership. This principle also outlines general expectations for verification protocols.
Scientific Rigor	Asserts that verification should assure effective implementation through scientifically rigorous and defensible, professionally established and accepted sampling, inspection, and certification protocols. Recognizes that verification shall allow for varying methods of data collection that balance scientific rigor with cost-effectiveness and the significance of or priority placed upon the practice in achieving pollution reduction.
Public Confidence	Calls for verification protocols to incorporate transparency in both the processes of verification and tracking and reporting of the underlying data. Recognizes that levels of transparency will vary depending upon source sector, acknowledging existing legal limitations and the need to respect individual confidentiality to ensure access to non-cost shared practice data.
Adaptive Management	Recognizes that advancements in Practice Reporting and Scientific Rigor, as described above, are integral to assuring desired long-term outcomes while reducing the uncertainty found in natural systems and human behaviors. Calls for verification protocols to recognize existing funding and allow for reasonable levels of flexibility in the allocation or targeting funds.
Sector Equity	Calls for each jurisdiction's program to strive to achieve equity in the measurement of functionality and effectiveness of implemented BMPs among and across the source sectors.

General comments addressing BMP verification protocol design and development:

To adhere to the Chesapeake Bay BMP Verification Principles (table 1), the committee recommend that the CBP:

1) Measure not only numbers of BMPs, but also appropriate indicators/outcomes of BMP adoption. Examples of indicators/outcomes might include soil P levels and more robust water quality monitoring at finer geographical scales.
2) Base BMP verification protocols on sound statistical sampling designs that consider, among other things, the objectives to be achieved, the populations being sampled, and the desired level of confidence/accuracy to be attributed to the data and conclusions drawn from the data.
3) Engage independent entities with appropriate expertise to design and implement BMP verification protocols (e.g., NASS has expertise in designing and executing producer surveys, academic partners could work with the CBP or jurisdictions in developing statistically-based monitoring designs, state agencies or USGS could perform additional water quality monitoring).
4) Focus verification in areas and/or towards specific BMPs that have the most impact on water quality.
5) Decouple BMP verification from BMP accounting for input into the CBWM (The timing of verification cycles and verification methods may not be compatible with generating data for the NEIEN system. Verification information and inferences from verification data can be used to adjust model input data if warranted.).

Specific comments addressing Section 12 "Partnership Process for Evaluation and Oversight" in the draft BMP Verification Committee report released July 15, 2013 (BMP Verification Committee, 2013):

Note: these comments address each sub-heading within Section 12. Comments 1- 7 address issues related to *Ongoing Decision-Making Roles within the CBP Partnership*. Comments 8 – 14 address issues related to *Evaluation and Oversight Procedures and Processes*.

Ongoing Decision-Making Roles within the CBP Partnership

1. CBP BMP Verification Review Panel: This panel appears to be an appropriate consensus group to assess the strengths and weaknesses in the seven jurisdictions' verification programs and whether the verification rigor is consistent across source sectors. However, since each source sector workgroup is intimately acquainted with the details of the various options within its own protocols, it seems to make sense to first have each source-sector workgroup compare verification protocols across all seven watershed jurisdictions for their sector-specific BMP verification protocols, and then make recommendations to the Panel for final evaluation. The source-sector workgroups could provide nuanced insights into the comparisons that might otherwise by overlooked by the Panel, or provide corrective recommendations for unintended applications of their protocols.
2. CBP Principals Staff Committee (PSC): The committee recommends that the PSC consult with the independent BMP verification protocol designers (see general comment # 3, previous section) before recommending changes and/or approving jurisdiction verification programs.
3. Chesapeake Bay Program Advisory Committees: Specifics about which committees will review what and when should be determined and specified in the BMP verification framework documentation. How the EPA, CBP, and jurisdictions will respond (including timeframe) to comments and critiques from the various committees should be specified.
4. Chesapeake Bay Program's Technical Workgroups: The role of the various technical workgroups appears to be consistent with current roles. The committee would, however, recommend that the expert panels, used to review and approve new and revised BMPs, not be charged with developing BMP verification protocols. The committee suggests instead that new BMP verification protocol development be performed by an independent entity with appropriate statistical and sampling design expertise, in consultation with the appropriate source-sector workgroup. It is likely that BMP verification protocols can be grouped rather than having a unique protocol for each. Given that the source-sector verification workgroups include representatives from each jurisdiction, asking the workgroups to perform this task will encourage developing BMP verification protocols that are achievable across all jurisdictions. Having said that, the committee believes it is a good idea to ask the BMP expert panels to suggest potential verification protocols as they develop their performance recommendation. The committee further recommends that the BMP expert panels be made up of those individuals with expertise relevant to the BMP and pollutant reduction mechanism being considered. Participation of state and federal program staff/managers on these panels should be limited.
5. Chesapeake Bay Program's Water Quality Goal Implementation Team (WQGIT): The role of the WQGIT appears to be consistent with the current role. Again though, the committee recommends that the WQGIT and the various workgroups not be charged with developing BMP verification protocols. The committee strongly suggests that the recommended independent entity be used to design BMP verification protocols with input from the appropriate WQGIT workgroup.
6. Jurisdictions: While the jurisdictions must be a partner in implementing BMP verification, the committee recommends that an independent entity be responsible for performing BMP verification. The entity and the tool/protocol used for BMP verification would likely be dependent on factors such as the type of BMP (structural vs. management) and the source sector (ag vs. urban vs. forest). Working with the entities

responsible for developing and executing the BMP verification protocols, the jurisdictions should be required to assemble their collection of verification protocols and determine who will execute those protocols from a suite of choices that have passed muster with the CBP Verification Review Panel.

7. U. S Environmental Protection Agency: EPA should consider holding back a portion of the Chesapeake Bay Implementation Grants and Chesapeake Bay Regulatory and Accountability Grants and use those funds to support the independent entities that have been recommended to design and implement the needed BMP verification protocols.

Evaluation and Oversight Procedures and Processes

8. Independent Review/Approval of Verification Procedures: To achieve the stated objective of obtaining a minimum threshold of BMP verification data confidence, the committee strongly suggests that an independent entity (academics or others with appropriate expertise) be involved in the design of the specific BMP verification protocols. Engaging those with appropriate expertise during the BMP verification protocol design phase will ensure that verification data will meet a desired confidence threshold standard.

9. Amended Partnership BMP Protocol to Address Verification: The committee interprets this section to mean that as new BMPs are approved, a corresponding verification protocol must be developed. As the committee understands it, the CBP proposal is to assign this task to the existing BMP expert panels who are responsible for developing BMP definitions and pollutant reduction performance efficiencies. The committee suggests instead that new BMP verification protocol development also be performed by an independent entity in consultation with the appropriate source-sector workgroup.

10. Amendments to the Chesapeake Bay Program Grant Guidance: As stated previously, EPA should consider holding back a portion of the Chesapeake Bay Implementation Grants and Chesapeake Bay Regulatory and Accountability Grants and use those funds to support the independent entities that have been recommended to design and implement the needed BMP verification protocols.

11. Annual Reviews of Progress Data Submissions: Documenting BMP verification for all BMPs on an annual basis is unrealistic. For those BMPs that are verified using techniques like remote sensing, survey tools, onsite evaluations, etc., the committee suggests verification documentation be tied to the CBP two-year milestone reporting cycle. For those BMPs that are assessed using indirect indicators/outcomes – e.g., soil or water quality monitoring – we suggest a longer time frame. This recommendation is a direct function of general comment #5 in the previous section – decouple BMP verification from BMP accounting. Verification information and inferences from verification data can be used to adjust model input data if warranted, but accounting for input into the CBWM should be separate from verification.

12. Annual Reviews of Quality Assurance Plans: If EPA holds back a portion of the Chesapeake Bay Implementation Grants/Chesapeake Bay Regulatory and Accountability Grant funds to fund independent entities to design and carry out BMP verification, as suggested, EPA would need to review the performance of the various entities rather than the jurisdictions. It would be extremely useful for the CBPO to work with the BMP Verification Review Panel and the GIT workgroups to develop a template of the required documentation/data to demonstrate that verification is actually happening, so that jurisdictions know what to expect and report.

13. Periodic Audits of Jurisdictions Verification Programs: The proposed combination of field and in-house audits to verify that the jurisdictions verification programs are working appears to be sound and time-tested in the tidal monitoring program, but additional documentation as to how this process is envisioned to work in

the BMP verification protocol context is warranted. Specifically, in the agriculture realm, the committee feels that accountability and verification will be severely compromised as long as spatially explicit information on agricultural BMPs is not publicly available. Further, if the CBP and jurisdictions are unable to find a way to ensure that a truly random sample of claimed BMP implementation can be visited by independent evaluators, then the BMP verification program can never resolve uncertainties associated with non-point source management efforts. Additionally, since many agricultural BMPs are management BMPs, as opposed to structural BMPs, the committee recommends that different approaches be used to assess the existence and performance of these management BMPs. Whereas structural BMPs are readily observable and can be evaluated on that basis, management or behavioral BMPs cannot. Management and behavioral BMPs are perhaps most readily verified through monitoring performance indicators/outcomes (e.g., water quality monitoring, soil sampling, crop yields). In this case, credit would only be given after reporting what actions had been taken.

14. Independent Evaluations: The committee agrees that periodic reviews by the various CBP advisory committees are critical to achieving the five BMP verification principles. Periodic (2-yr) evaluations would be a reasonable additional check and balance that will help assure the BMP verification framework is being adaptively managed. How the EPA, the CBP, and the jurisdictions will respond (including timeframe) to comments and critiques from the various committees should be specified.

General Recommendation:

1. Develop a flow chart that clearly defines the BMP verification oversight and evaluation process. Include the roles and responsibilities of all parties involved in BMP verification oversight and evaluation, critical activities and timelines, and data/documentation requirements.

Conclusion:

In general, the committee believes adjustments are needed to the proposed BMP verification framework and to the evaluation and oversight procedures outlined in Section 12 of the draft framework report (BMP Verification Committee, 2013). As proposed, the verification oversight appears to be focused on an initial review of the jurisdictions verification plans. While performing an initial comprehensive review is good, there needs to be a robust, independently managed, and transparent procedure by which the verification protocols are designed and implemented, and periodically, if not continually, reviewed and revised.

As presented, the BMP verification process is somewhat analogous to the nutrient management planning (NMP) BMP. While the intent of the NMP BMP is to balance nutrient inputs and crop needs, current NMP BMP accounting is based on the number of “acres planned”, not the actual “acres implemented” or, more importantly, not on the actual realized reductions in excess nutrient application to the land. Similarly, the BMP verification process should not focus on documenting the BMP verification paper trail, but rather on verifying actual observations that BMPs exist and are functioning. As proposed, the first twelve elements of Section 12 of the draft BMP framework appear to mainly address process documentation. Only the last two elements of Section 12 appear to focus on verifying on-the-ground implementation.

References:

BMP Verification Committee (CBP WQGIT BMP Verification Committee). 2013. Strengthening Verification of Best Management Practices Implemented in the Chesapeake Bay Watershed: A Basinwide Framework. July 15, 2013. Chesapeake Bay Program Partnership.
http://www.chesapeakebay.net/channel_files/20847/cbp_verification_document_7-15-2013_review_draft_full.pdf