

**Watershed Agricultural Program
Recommendations for New York City's 2017 FAD**



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Executive Summary

After 20 years of planning and implementing best management practices (BMPs) in the West of Hudson NYC Watershed, the current water quality issues in need of BMP implementation exceeds 31 million dollars. The identification of new and repair & replacement BMPs continues to exceed the annual implementation budget. It is critical that a new short and long term approach be implemented to effectively sustain the BMP implementation strategy into the future.

In the short term the repair & replacement BMP budget needs to have separate adequate funding to maintain the investments in water quality measures. The long term approach will include a re-evaluation of the Watershed Agricultural Program (WAP) including a census of agriculture activities, scientific research and updating the Watershed Decision Support document.

The Stroud Water Research Center in Pennsylvania has been recognized nationally for their work on riparian forest buffers and stream ecology. The USDA Farm Service Agency (FSA) has revised their definition of marginal pasture land as a result of Stroud's research. This has opened up additional opportunities for cost share for riparian forest buffers to non-Ag land owners. A pilot program will be developed to determine the viability of selecting the highest priority tributaries with significant agricultural presence for riparian forest buffers.

BMPs damaged by flooding events create emergency situations regarding water quality, human safety and farm economic viability. It is critical that a flood contingency fund be available to the WAP to address these emergency repairs.

The Precision Feed Management (PFM) program has been well-established through a 15 year study. With the incorporation of PFM into the WAP as a result of the 2007 FAD midterm review, the single largest agricultural source of phosphorus was placed under regular monitoring and management. The PFM program should be expanded to all dairy farms and a limited number of beef farms in the West of Hudson NYC Watershed.

The 2017 FAD recommendations included in this report will help position the WAP for continued and improved water quality protection for the next 10 years.

Best Management Practice (BMP) Implementation Goals

Introduction

The current FAD states “Maintain 90% active large farm participants.” There is no FAD metric in relation to the level of BMP implementation to address water quality resource issues. The first 20 years of the WAP were very effective in developing whole farm plans (WFPs) and identifying water quality issues in the form of best management practices (BMPs). The WAP has 288 active WFPs and has implemented over 7,100 BMPs worth in excess of 56 million dollars. The current issue is that WAP has over 31 million dollars in identified BMPs without adequate funding to complete implementation of these BMPs in a timely manner (see Chart 1 & Chart 2). Completing BMPs in a timely manner is critical for a voluntary participation program.

The BMP prioritization methodology is limited to only organizing and prioritizing BMPs, it does not address the rate of BMP implementation.

Full implementation of WFPs on participant farms is a primary goal to sustain water quality over the long term.

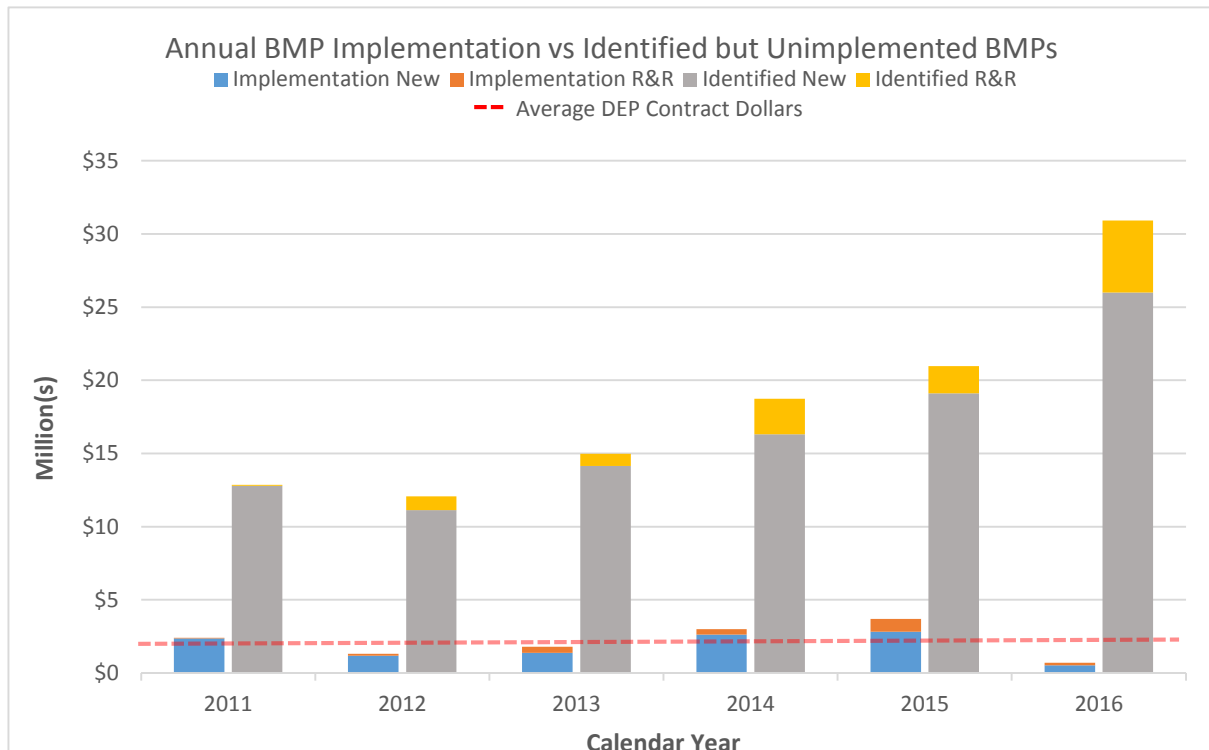


Chart 1

Definitions: "New" - BMP in a Whole Farm Plan, to address a specific resource concern, that has not been implemented in previous years.

"R&R" - Repair or replacement of an existing implemented BMP that is no longer functioning properly.

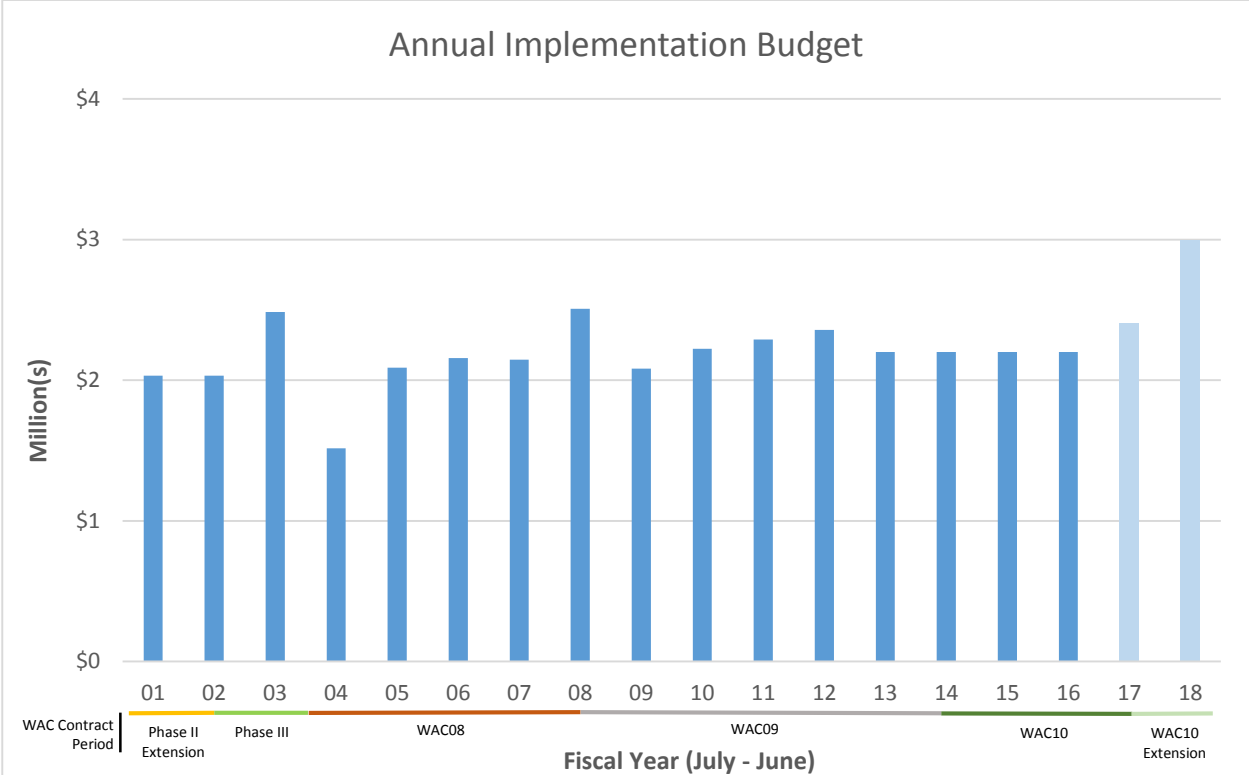


Chart 2

Notes: - Implementation budget dollars have remained stagnant from 2001 - Present.
 - The increased implementation budget in the WAC10 Extension ('17-'18) will not create an adequate implementation rate to complete BMPs in a timely manner.

Problem

The WAP’s whole farm planning program is doing an effective job of identifying resource concerns, however participants are told it could take 5 years or more for implementation of high priority BMPs. WAP participants are frustrated with the delayed rate of BMP implementation, making some reluctant to engage in Annual Status Reviews (ASRs). There have been 8 participants to withdraw from the WAP in the past 3 years, of these, three participants withdrew due to delayed implementation. The WAP whole farm planners indicate there are additional participants that are considering withdrawing from the WAP due to delayed or lack of implementation. This is a concern as it puts the program’s participation rate in jeopardy.

As BMPs age out of their life span, the cost of repair and replacement is increasing. In 2011, WAC repaired 10 BMPs at a cost of \$50,000. In 2015, WAC repaired 120 BMPs at a cost of \$872,000. Currently, there is repair and replacement needed on 169 BMPs at an estimated cost of \$4,926,751.

Solution

New BMPs will be funded at or above current implementation funding levels. This will allow the WAP to more accurately schedule new BMPs for implementation each year. Designating the current funding level to the implementation of new BMPs is critical to offset the higher standards and specifications needed to solve the water quality issues.

The repair & replacement of expiring BMPs will be adequately funded and implemented in a timely manner. The funding of repair & replacement BMPs will be separate from the funding of new BMPs.

This new approach to funding levels will have an immediate impact on repair and replacement BMPs before they become emergency situations.

Participants in good standing with the WAP will be considered for BMP implementation. Participants in good standing means that they are willing to follow the rules and policies of the WAP and are in compliance with their O&M agreements.

FAD Recommendations:

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| Maintain at least 90% active large farm participation. | Continue |
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| New BMPs will be funded at or above current implementation funding levels. | New – To begin 18 months after issuance of 2017 FAD. |
| Repair & replacement BMPs will be adequately funded separately from the funding of new BMPs. | New - To begin 18 months after issuance of 2017 FAD. |

Re-evaluation of the Watershed Ag Program Strategies

Introduction

As part of a long term approach to BMP implementation strategy, new goals need to be defined for the Watershed Ag Program (WAP) for the next 10 years. The core program concepts include voluntary participation, local control, agriculture as the preferred land use and adequate funding by DEP need to be retained.

The focus of this evaluation is to put emphasis on participant engagement, conservation stewardship, and to ensure that the WAP continues to provide the best cost effective voluntary water quality program.

Problem

Focus Areas

1. Census
2. Science/Modeling
3. Watershed Decision Support document
4. Participant Engagement

Census

One of the important key elements of any successful watershed management program is quantifying the current potential participants and potential water quality issues that may be associated within the working landscape of these agricultural enterprises.

The agricultural operations are dynamic within the watershed boundaries. Currently, the WAP accepts applications and works with those operations that voluntarily participate in the WAP. The WAP has no current process established to identify and prioritize all agricultural activities within the NYC Watershed. Without knowing the extent, location and range of all current agricultural activities, it is difficult to maintain proper reporting.

Science/Modeling

Currently, BMP prioritization is based primarily on the order that the pollutant categories were established at the beginning of the program. The WAP currently does not have the data to justify which water quality practices present the best value to the program.

Watershed Decision Support document

The “Watershed Decision Support” document, developed in the early 1990’s, was the foundation of the Watershed Ag Program and is still the basis of the WAPs planning and implementation. This document may not reflect the current science and the most effective approach for the WAP.

Participant Engagement

Currently the WAP processes are not designed to foster conservation ethic directly. There are no programmatic or policy means that do this. This creates an issue with the long-term voluntary nature of the program. Participants are not given incentive to be proactive conservation stewards.

Solution

Census

Implementing a census of all farming activities in the West of Hudson is the first step to identifying the shortfalls of the current WAP strategy. Conducting a census on a regular basis will help WAC determine the highest priority WFPs to develop and will better focus WAC program efforts in the future. The WAC believes a three year census is an appropriate time frame due to the ever changing agricultural landscape.

Science/Modeling

The WAP believes it may be timely for a science based, independent research organization to review the WAP planning and implementation processes. Areas may include the WFP pollutant categories, and specific BMP return on investment. This will ensure the WAP continues to provide the best cost effective voluntary watershed protection program.

Watershed Decision Support document

Develop a plan, criteria and parameters for the review of WAP planning, implementation and monitoring processes to ensure continued cost effective water quality protection.

Establish an Ad Hoc Advisory group, which includes but is not limited to, Watershed Ag Council, Delaware County Soil & Water Conservation District, Cornell Cooperative Extension, Dept. of Environmental Protection and farmer representatives. The group

will review the Watershed Decision Making Document to revise and update the strategy for the future.

Participant Engagement

The re-evaluation needs to incorporate participant engagement and conservation ethics as core principals. The WAP is a water quality program that needs to be pro-active and not reactive to sustain and improve water quality long term. Develop programs within WAP that promote a conservation ethic with participants.

FAD Recommendations:

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| <p>DEP to contract with WAC to properly resource and staff the WAP to implement a continual agricultural census system.</p> | <p>New – Develop an Ag census plan. Due 1 year after the issuance of 2017 FAD.</p> |
| <p>WAP to conduct Ag Census every 3 years.</p> | <p>New – The 1st census report will be due 3 years after the issuance of 2017 FAD.</p> |
| <p>DEP to contract with WAC to develop a plan for science/modeling of WAP planning, implementation and monitoring strategies.</p> | <p>New - The Plan to be submitted 2 years after issuance of 2017 FAD.</p> |
| <p>DEP to contract with WAC to facilitate the science/ modeling of WAP planning, implementation and monitoring strategies.</p> | <p>New – Due midterm FAD</p> |
| <p>DEP to contract with WAC to evaluate the Watershed Decision Support document based on science/modeling and census results. *Including but not limited to Watershed Ag Council, Del. Co. Soil & Water Conservation District, Cornell Cooperative Extension, DEP and farmer representatives</p> | <p>New – Due 8 years after issuance of 2017 FAD.</p> |

Opportunities to Accelerate Riparian Buffer Implementation

Introduction

The Conservation Reserve Enhancement Program (CREP), administered by the USDA/Farm Service Agency (FSA) with administrative and technical assistance provided by the Watershed Agricultural Program (WAP), has been an effective partnership in establishing buffers on agricultural land. The CREP provides cost sharing, annual payments and other incentives to agricultural producers. This helps to offset the costs of buffer establishment, including: tree and shrub planting, buffer maintenance and property taxes on the idled land. Until 2015, only active agricultural land had been eligible for CREP participation.

In recognition of the importance of Riparian Forest Buffers in improving water quality, the five Stream Corridor Management Programs, in partnership with the NYCDEP, established the Catskill Streams Buffer Initiative (CSBI). This program has provided opportunities for non-agricultural landowners to establish riparian buffers. Limited funding for the CSBI has been provided by the NYCDEP, and although the CSBI has been relatively successful, the pace of CSBI implementation has been slower than CREP due to CREP's payments and other incentives.

The Stroud Water Research Center in Pennsylvania has documented significant in-stream water quality benefits provided by riparian buffers. In response the USDA/FSA has now expanded the definition of land eligible for CREP to include land that has been previously farmed or has been idle or fallow for a long period of time.

This change will provide resource professionals with the incentives to encourage non-farm landowners to establish buffers, thereby accelerating the establishment of CREP Buffers throughout the watershed. The addition of CREP will also stretch NYCDEP CSBI funding dramatically. Other benefits will include program administration and contract maintenance provided by the FSA, allowing CSBI Coordinators to focus more on plan development and other technical services.

Problem

The CSBI and WAP are focused on providing CREP or riparian buffers to municipal land owners and active farm owners respectively and do not have the resources to proactively engage private landowners of idle and fallow land.

The land between active farming operations does not have a targeted program to enroll in CREP or riparian buffers.

Based on the Stroud Research, the lack of forest cover along streams allows 57% of phosphorus laden sediment and 74% of nitrogen that doesn't get filtered by buffers, to flow down the stream without being processed by instream microbial action (Stroud Water Research Center – Appendix 1).

Solution

In recognition of recent changes for CREP eligibility, the Watershed Agricultural Program and the Delaware County Soil and Water Conservation District cooperatively propose the development of a pilot program to integrate and coordinate the efforts of the CREP and CSBI programs. This pilot will be a phased approach, selecting the highest priority tributaries with significant agricultural presence. Non-farm landowners located between farms will be targeted and contacted for participation.

This pilot program may be achieved economically by the addition of modest staff and funding increases to the WAP. The CSBI Coordinator and buffer implementation budget items will be re-tasked to the Pilot Program without the need for additional funding. It is projected that an 18-month pilot program will determine the viability and need for a longer-term program.

Until recently, the in-stream water quality benefits of Riparian Forest Buffers have not been fully realized. The advent of Stroud's research and recent changes to the CREP eligibility requirements, provide exciting opportunities to accelerate the implementation of Riparian Forest Buffers within the New York City Watershed. This proposed pilot program will help quantify the opportunities.

FAD Recommendation:

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| <p>DEP to contract with WAC to develop an integrated CREP & CSBI 18 month pilot program to determine the viability for a longer term program. A longer term program would be funded in a phased approach if it is determined to be viable from the 18 month pilot program.</p> | <p>New - Pilot program report due 18 months after issuance of 2017 FAD.</p> |
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Flood Response Initiative

Problem

Extreme weather events can't be predicted and when flooding occurs as a result of these extreme weather events BMPs are put at risk of being destroyed or badly damaged. Funding from state and federal sources do not cover all of the damages from these flooding events. BMPs that are damaged by localized flooding events that do not trigger state or federal funding also put a higher demand on the WAP implementation budget to repair these BMPs in a timely manner. These emergency repairs displace BMP implementation funds that were already allocated to other water quality issues.

In the months following the June 2006 flood, approximately \$322,000 of WAP funds were reinvested in the repair/replacement of BMPs still needed in active WFPs. The WAP has also invested approximately \$240,000 in BMP repairs due to major weather and flooding events that followed in subsequent years. Included in that total is the major storms of Irene/Lee in 2011 which used \$94,257 of WAP BMP implementation funding.

In consideration that 62% of riparian tax parcels over 1 acre in size in the Cannonsville watershed are in some phase of agricultural use, an agricultural flood response initiative is warranted and should be added to the FAD and funded through the Watershed Ag Program.

Solution

A contingency fund needs to be established in the WAC/DEP contract that can be easily accessed by WAC for emergency flood response on agricultural land by WAP staff. The initiative should provide contingency funding for flood-related water quality impairments including:

- Emergency Stream Intervention where compromised stream channels have avulsed or significantly reduced "bankfull capacity", creating water quality impairments on cropland and pastures.
- Emergency flood-related BMP repairs not covered by state or federal programs.

FAD Recommendation:

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| DEP to contract and provide WAC with a contingency fund for flood related water quality impairments equal to 10% of their average annual BMP implementation budget.* | New - To begin 18 months after issuance of 2017 FAD. |
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* For example an average annual implementation budget of \$3 million would have \$300,000 in a flood contingency fund.

Precision Feed Management (PFM) in the FAD

Introduction

Along with nutrient management and the Nutrient Management Credit program, Precision Feed Management (PFM) has been a successful effort within the NYC Watershed. The following points clarify the efficacy and contributions of PFM from scientific and empirical data generated from the experience of implementing precision feed management in the NYC Watershed over the last 15 years. The efficacy of PFM has been well-established through this previous body of work.

- PFM addresses the largest source of Phosphorus.
- PFM has a proven history of successful nutrient management impact.
- PFM keeps participating farmers engaged in the WAP.
- PFM benefits farm economic viability as well as water quality.
- Feed management, by nature and need is an on-going process: It engages a variable production system requiring on-going support.

(See Appendix 2 for reference)

With the incorporation of PFM into the NYCWAP as a result of the 2007 FAD mid-course review, the single largest agricultural source of phosphorus was placed under regular monitoring and management.

FAD Recommendation:

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| PFM be offered to all dairy farms, and a limited number of beef farms in the West of Hudson NYC Watershed. | New - To begin 18 months after issuance of 2017 FAD. |
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Other FAD Deliverables and Recommendations

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| <p>Develop 50 new Whole Farm Plans on large, small, or east-of-Hudson farms unless written evaluation and justification for developing fewer than 50 WFPs is submitted to NYSDOH/EPA for review and approval.</p> <p>Submit to NYSDOH/EPA for review and approval justification for developing fewer than 50 WFPs.</p> <p>Change to: Develop new whole farm plans (WFPs) as needed, continue the development of new WFPs for prioritized farms that meet eligibility criteria to solve water quality issues, transition farms and easement potential applicants.</p> | <p>Ongoing</p> <p>8 months after issuance of Revised 2007 FAD</p> <p>New - To begin with the issuance of 2017 FAD.</p> |
| <p>Conduct annual status reviews on at least 90% of all active Whole Farm Plans (with a goal of 100%) and revise Whole Farm Plans as needed based on their priority status.</p> | <p>Continue</p> |
| <p>Maintain current nutrient management plans on 90% of all active participating large farms.</p> <p>Change to: Maintain current nutrient management plans on 90% of all active eligible participating farms with approved WFPs.</p> | <p>Current</p> <p>New - To begin with the issuance of 2017 FAD.</p> |
| <p>Continue to make available the Nutrient Management Credit Program to at least 100 watershed farmers.</p> <p>Change to: Continue to make available the Nutrient Management Credit Program to all eligible West of Hudson watershed farms. *</p> | <p>Current</p> <p>New - To begin 18 months after issuance of 2017 FAD.</p> |

* This contract deliverable was increased in the 18 month extension (7/1/17-12/31/18) of the WAC/DEP contract from 117 farms to 135 farms. Recommend full funding of all eligible farms in the watershed for the Nutrient Management Credit Program. Current estimates of eligible farms is between 135 and 140 farms.

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| Implement new BMPs and repair/replace existing BMPs on active participating large, small and east-of-Hudson farms according to a BMP Prioritization Methodology. | Continue |
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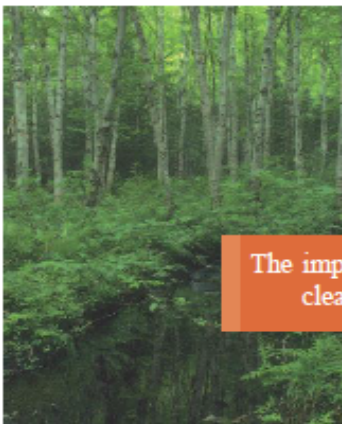
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| Develop new and re-enroll expiring CREP contracts. | Continue |
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| <p>Implement the Farmer Education and Farm-to-Market Programs.</p> <p>Change to:</p> <p>Implement the Farmer Education and Economic Viability Programs, with an emphasis on transitioning farms.</p> | <p>Current</p> <p>New - To begin 18 months after issuance of 2017 FAD.</p> |
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Research FROM THE FIELD

Stroud Center study shows value of streamside trees

In an exhaustive study of sixteen streams in Eastern Pennsylvania, a multidisciplinary team of researchers, led by scientists from the Stroud Water Research Center, found further evidence that streamside (or riparian) forests play a critical role in cleaning up our streams and rivers. The 2004 study, published in the prestigious *Proceedings of the National Academy of Sciences*, demonstrated that, not only do trees keep pollutants out of streams, *trees also help those streams better process pollutants that get into the water.*



The Stroud Center team found that stream sections flowing through forested areas are wider and shallower than those in meadowlands, their beds are rougher and have more habitat, and water moves more slowly through them. These factors, along with other riparian forest benefits, such as a greater variety of organic food and more natural temperature patterns, produce a richer and more natural ecosystem than is found in deforested streams – and one that is far better able to process pollutants in their waters.

The implications of these findings are potentially enormous because they indicate that restoring riparian areas to their natural forested state is a very cost-effective way of protecting the world's fresh water. Over the course of the last century, public policies aimed at providing sufficient and clean, fresh water have primarily focused on massive and expensive engineering projects, such as dams and filtration plants. They have rarely addressed the accelerating deforestation across the country and around the world.

In doing so, such policies have overlooked – and often destroyed – the substantial benefits that nature provides, free of charge. Perhaps nowhere is the value of such “ecosystem services” more evident than in streams and rivers, where hundreds of trillions of tiny organisms work constantly to clean the water.

The implications...are enormous, for forested streams will deliver cleaner water to downstream rivers, estuaries and, ultimately, oceans.

The Stroud Center conducted this study on small streams, which comprise more than 90 percent of all streams in the United States. This suggests that great potential exists for improving water quality by planting trees along streams, given that forested streams will deliver cleaner water to downstream rivers, estuaries and, ultimately, oceans.

The study's results were particularly striking with regard to nitrogen, a leading pollutant of concern in surface water. **The study found that forested sections of streams removed 2-8 times more nitrogen than unforested sections.**

Riparian forests in our watershed

Three hundred years ago the Mid-Atlantic region of the United States was entirely forested. The streams were shaded, and all the organisms that lived in them were adapted to woodland conditions. As the land was settled, the forests were cut down and replaced with agricultural fields to provide food for the growing population. Today, suburban sprawl threatens many existing riparian forests, almost all of which are secondary growth.

Riparian forests are essential to the health of our streams and rivers in a number of ways:

- They are natural filters, trapping sediments before they can enter the stream.
- They minimize erosion and the effects of flooding.
- They encourage groundwater infiltration.
- They supply the shade necessary to maintain cool water temperatures and rich oxygen levels.

- They provide essential habitat for the entire food chain, from bacteria to algae to insects to fish.
- They enhance the diversity of life in the stream.
- They are home to a variety of mammals, birds, amphibians and reptiles.
- They enable the stream to more effectively process, break down, and remove pollutants that reach the stream.

Go to www.stroudcenter.org to link to full article in the *Proceedings of the National Academy of Sciences*.

Appendix #2

Precision Feed Management (PFM) in the FAD

Introduction

Along with manure nutrient management and the manure nutrient management credit program, Precision Feed Management (PFM) has been a successful effort within the NYC Watershed. The following points clarify the efficacy and contributions of PFM from scientific and empirical data generated from the experience of implementing precision feed management in the NYC Watershed over the last 15 years. The efficacy of PFM has been well-established through this previous body of work. We recommend the following going forward in the next FAD:

- PFM be offered for to all dairy farms, and a limited number of beef herds in the West of Hudson watershed.

1. PFM Addresses the Largest Source of Phosphorus:

With the incorporation of PFM into on-going nutrient management planning and monitoring efforts of the NYCWAP following the 2007 mid-course FAD review , *the single largest source of agricultural phosphorus* (and likely the largest non-point source) in the NYC Watershed has finally been placed under regular, systematic management.

- **FACT:** NYCWAP records indicate that there are over 5,200 mature dairy cows in the WOH NYC Watershed. Based on typical ration phosphorus demographics for this region, these mature dairy cattle are estimated to **consume over 384,000 lbs. of P per year.**
- **FACT:** This total dairy feed P intake directly impacts the **over 163,000 lbs. of manure P** excreted annually by these same mature dairy cows in the WOH NYC watershed. Manure nutrient management plans manage manure P once on the farm. PFM can affect how much P enters the farm and is excreted in the manure to begin with.

Having the PFM program in place with ongoing dietary monitoring and management is a successful achievement in and of itself; that the feed nutrient status of this largest pool of agricultural P is under management, and is no longer of unknown status. *It cannot be reasonably argued that the largest source of P on farms should not be monitored or managed.* The PFM program is currently, and will continue

to report the total mass of feed nitrogen (N) and P under management through the program annually.

2. PFM has a Proven History of Successful Nutrient Management Impact:

Precision feed management was developed and piloted in Delaware County as a conservation practice over the last sixteen years. PFM, in Delaware County as elsewhere in NYS and the US, has a documented, robust nutrient management impact track record. There is a USDA NRCS national feed management planning standard which has been adopted in NY and which includes standards for ration P levels for dairy cattle. These standards, which are accepted standards in the dairy industry, are based on National Research Council guidelines. The Delaware County PFM group was instrumental in developing the NYS standards for dairy feed management planning and implementation, including methodologies for monitoring dairy cattle diets to determine if rations P standards are met.

- **FACT: Past PFM efforts have demonstrated that PFM can result in reduced N and P excretions and milk/feed mass balances.**
 - 4.1 and 15.2 kilograms per cow per year, representing 18.6% and 9.8% reductions in fecal excretion N and P and reductions across farms reported in the Delaware County PFM 2008 – 2012 Phase 2 report (Cerosaletti, 2012).
 - 5.2 and 12.6 kg per cow in reduced P and N manure excretions, representing a 22% and 8% reduction in manure excretions respectively for the Delaware County PFM Program Phase 1 report (Cerosaletti, 2008)
 - From 2004 – 2012 the average Del Co PFM project farm had a net decrease in purchased feed/milk mass nutrient balance (difference between purchased feed nutrient imports and milk nutrient exports) of 197 and 1,150 kg per year for phosphorus and nitrogen respectively. Since 2004, PFM program farms have decreased purchased grain imports 1.8 kg per cow per day while simultaneously increasing homegrown feeds in the diet nearly 16%, a direct result of the two-pronged PFM program approach to help farms implement more accurately balanced diets as well as produce more homegrown feed and integrate it into lactating cattle diets. PFM demonstrated a decrease in the farm mass nutrient balance.

3. Precision Feed Management Engages Farmers and Keeps Them Engaged in the WAP and Implementing Conservation:

A successful voluntary water quality program like the WAP relies upon farmer participation and a high degree of engagement in order to implement any conservation BMPs. To achieve this, a water quality program must be relevant and timely to the farmer participants to keep them engaged. *Program staff must be engaged with farmers regularly* to maintain relationships with them and to ensure that the WAP is relevant and effective for both farmers and water quality. It is a mutual relationship. Detached and delayed engagement which has become more common since the implementation of BMP Prioritization, results in farmer's perceiving they are not receiving on-going benefit from the program and threatens farmer participation and the long term program success. *Programs like Nutrient Management planning, Nutrient Management Credit and PFM have been successful in keeping farmers engaged in the NYCWAP.* **PFM is designed as a high engagement process, focused on a farms current needs, with real-time implementation occurring on the farm, with real time benefits to both water quality and farm economic viability.**

- **FACT:** Through the first 6 months of the PFM program in the NYCWAP, the PFM staff have, on average, been engaging farmers in meaningful management events (defined through the WAP Quality Management Assistance process) at the rate of over one event per farm per month. The Program staff are assisting farmers make real-time strategic management decisions to implement PFM as a conservation BMP.

Contributions of PFM to the NYCWAP be documented through annual program engagement statistics and PFM-Farmer Success stories.

4. Precision Feed Management Benefits Farm Economic Viability as well as Water Quality:

The popularity of PFM with farmers stems largely from the benefits *they* realize from the PFM process that ultimately benefits the long term economic viability of their farm. Past PFM efforts have demonstrated that PFM can have positive economic impacts on the farm business, in both cost control and/or improved productivity. PFM can also help a farm position itself better for the future through strategic planning, decision making and successful tactical implementation.

- **FACT:** Farms participating in the Delaware County PFM program benefited economically, showing a reduction in operating costs of \$1.33/cwt of milk sold and 11% higher milk production compared to similar sized farms in the region that are not participating in the PFM program. There is a growing number of Farmer-PFM Success Story that witness these impacts on farm profitability and productivity resulting from PFM efforts.

5. Feed Management, by nature and need is an On-Going Process: It Engages an Inherently Variable Production System Requiring On-Going Support;

The successes of PFM can be attributed to the on-going support that staff provide to farmers and their feed industry advisors. Feed management on dairy farms is implemented ultimately as a daily process, with monthly, seasonal, and yearly time steps which includes the annual growing, harvest and storage of crops on the farm. Inherent in this process is variability in feed stuffs, animals, weather and environmental and market conditions, all of which require vigilance in order to manage diets for productivity and for conservation benefits. Cattle rations, including P intakes and excretions, can and do vary monthly, if not daily. There is no reasonable assurance that rations once balanced to requirement for P, will remain that way. The only way to know is through routine monitoring and management.

- **FACT:** PFM program records over the last fifteen years show *that approximately 40% of the time diets exceed animal P requirements. The instances of excessive ration P routinely include diets that were previously "in check" for P intakes and have "drifted" into excess due to feedstuff, animal, and/or environmental variability.* Routine monitoring and management is the only way to know if and when diets exceed animal requirement, and to identify strategies to manage them accordingly.
- **FACT:** phosphorus, although an important macro-mineral for dairy cattle, within the range of typical cattle intakes is **not** a major driver of animal productivity. It therefore *does not get regular ration scrutiny as a ration critical control point for precise management by the feed industry.* In order for herd nutritionists to formulate diets closer to animal requirement, and farmers to have confidence to feed these diets, both must be provided with technical support to ensure that the true animal P requirement and feed P supply are known. This is precisely what PFM as implemented in the NYCWAP does.

PFM is not a “Once-and-Done” BMP that gets implemented and can function independently for a number of years. Regular monitoring, planning and implementation are required. A summary of PFM benchmark data including the number and % of benchmarks across farms that are in compliance for accepted P feeding standards are reported annually.

Summary:

With the incorporation of PFM into the NYCWAP as a result of the 2007 FAD mid-course review, the single largest agricultural source of phosphorus was placed under regular monitoring and management. Given the inherently variable nature of dairy cattle feeding requiring on-going monitoring and technical support, and that program data demonstrates that diets can routinely be over animal requirement for P, there is ample reason that PFM should continue to be implemented as part of the WAP. The national and NYS standards and processes for feed management planning and implementation are well established and have proven successful over the last fifteen years of implementation of PFM in the NYC watershed and elsewhere. PFM has been proven beneficial for conservation (nutrient management) and additionally for farm economic viability. The regular, real-time benefits from PFM that farmers have experienced for their businesses have helped keep them engaged in implementing conservation on their farms across the entire NYCWAP program.