Pilot Project[1]
Programmatic Report

Summary

Fifty farms were evaluated for their level of water quality protection and Continuous Improvement Plans (CIPs) were developed for each farm that will move them closer to Chesapeake Bay protection goals when implemented. As a result of participation in the WSI program, seven farms are in the process of obtaining a Nutrient Management Plan (NMP) that never had one before. Many participants have responded in the short term by reducing or eliminating poultry litter application on high phosphorous fields even if application is currently allowed under their NMP. WSI is a member of the Virginia Regulatory Advisory Panel for development of regulations to implement legislatively mandated Resource Management Plans (RMP). This is largely because much of the language describing the RMP mimics the WSI Continuous Improvement Program. While it is unclear what RMP requirements will be, they have to meet (quantitatively) the expectation from agriculture under the VA TMDL WIP. Thus, farmers who are engaged in the WSI CIP program should be positioned to meet VA RMP expectations/regulations.

Outcomes

Water Stewardship Inc. recruited 50 farms into our whole farm assessment, verification and continuous improvement program in the Shenandoah Valley, Virginia. The farms include small to mid-size poultry, dairy, and beef operations from representative communities within the geographic region, including a substantial number of Old Order Mennonite farmers who have historically been reluctant to engage in other programs. Relevant farm documents were collected and site visits conducted to assess current levels of conservation performance and to identify opportunities for further nutrient loss reductions. Nutrient loads were calculated using the WSI Nutrient Load Estimator (NLE) for the "No BMP" and "Existing" scenarios to estimate the farms current progress toward reaching the Virginia TMDL/Tributary Strategy goal of a 55% reduction from the "No BMP" load. Unique and tailored CIPs were developed for each farm to achieve at least a further 33% reduction in the first two-year CIP cycle.

Adjustments were made that differ from our original project proposal in some minor ways. For example, CIPs are now written in two-year increments to provide more specific and short-term goals for the farmer to work toward. Also, WSI no longer uses a Conservation Baseline (CBL) approach, but rather requires the components of the CBL to be implemented within the first year of participation in the WSI program. This decision was made based on feedback from farmers during our Beta Test that the CBL practices of nutrient management, animal waste management, and erosion control should be basic expectations and that the program is better designed to simply require these practices.

In addition to these 50 farms, WSI continues to work with 33 farms recruited during our Beta Test project in 2009. The remaining Beta Test farms are scheduled to be reassessed during their biennial CIP implementation visits during the winter of 2011/2012.

Due to organizational budget constraints, WSI trained two Conservation Assessment Professionals (CAPs) to work on farms in this project but they were used to a limited extent. Most assessment, verification and continuous improvement work was done "in-house" by WSI staff to minimize additional costs.

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Evaluation of CIP implementation is challenging because CIPs developed for this project are not scheduled for their implementation assessment for two years. In lieu of the opportunity to conduct the biennial assessment within the project time frame, WSI conducted interviews with farms at CIP delivery to get feedback on the likelihood of short-term implementation for each recommendation contained in their CIP.

Funding ($3K) was insufficient for a thorough economic analysis of CIP implementation and WSI learned from farm participants that individual context controlled so much of the cost of implementation that this type of evaluation would have limited utility. WSI used existing cost-effectiveness estimates from the Chesapeake Bay Program to guide our recommendations in the CIPs with the understanding that some actions may not be economically feasible depending on market conditions and available cost share programs.

WSI activities related to integrating verified continuous improvement into the food system supply chain was also modified during the execution of this project. As major food companies and integrators have increasingly focused on efficiency metrics and strategies that target processing and transportation, WSI found that medium sized cooperatives are looking to differentiate themselves through supply chain metrics like those within the WSI program. In particular, WSI met with the board of the Virginia Poultry Growers Cooperative (VPGC) and presented our approach to their annual growers meeting in Harrisonburg. As a result, about 20 of the farms in this project grow turkeys for VPGC. WSI plans to have additional meetings with VPGC to assess their interest in enrolling a larger share of their growers in the WSI program. WSI is also working with the newly formed Shenandoah Valley Beef Producers Cooperative (SVBPC) and enrolled all 20 board members into the WSI program. Although they are still in the process of business plan development, WSI will continue to meet with the SVBPC board to explore certification of their members and marketable products. As part of an effort spearheaded by the Shenandoah Valley Resource Conservation and Development Council, WSI is a primary partner in the Farm to Table project in the Valley. This project will involve an additional 25 farms that will demonstrate their commitment to verified conservation performance by working with WSI. The program will reward them by facilitating their engagement with local food markets to institutional buyers like universities and hospitals.

Results

The WSI Pilot Project consisted of 50 farms with a total of 13,713 acres for an average of about 275 acres per farm. The following charts show the breakdown of acreage and animal numbers by type for the 50 farms in the Pilot Project. Denuded pasture refers to a new land use load developed by WSI, during this project, to describe any semi-confined feeding area in a pasture where the ground is denuded and bare of grass for a majority of the year. There was a total of 109 acres of denuded pasture among the 50 farms. Unfertilized Grass and Forest represent existing stream buffers that totaled 259 acres. The degraded stream corridor represents about 93,000 linear feet (~17.5 miles) of stream in pasture that is not currently fenced from animal access. All of this stream length has been recommended for fencing in the corresponding CIP for the farm where it exists.

Acres by land use and farm type among 50 participating farms (all values in acres)

Farm Type	# of Farms	Alfalfa	Pasture	Hay	Row Crops	Forest	Unfertilized Grass	Degraded Stream Corridor	Denuded Pasture
Beef	7	25	845	459	233	106	23	2	5
Beef-Poultry	13	11	2,155	548	1,158	49	11	15	12
Dairy	21	352	1,479	387	4,091	9	52	7	86
Dairy-Beef	2	73	378	29	307	0	9	1	1
Dairy-Poultry	2	0	104	2	124	0	0	2	0
Poultry	5	0	213	69	266	0	0	5	5
TOTAL	**50**	**461**	**5,174**	**1,494**	**6,179**	**164**	**95**	**32**	**109**

Animal numbers by type among 50 participating farms

Animal Type									
Back grounding Cattle*	Broilers	Dairy Cows	Dairy Heifers	Dry Cows	Feedlot Beef Cattle	Hogs for Slaughter	Layers	Pastured Beef Cattle	Turkeys
335	732,000	4,488	2,507	45	200	100	180,000	2,009	125,200

**Back grounding cattle is a growing business in Virginia and consists of feeding cattle are received weighing 300-400 lbs to a weight of 600-800 lbs in a semi-confined space to send to western feedlots for finishing..*

Through the interview process during CIP delivery, it became apparent that several recommendations for BMP implementation were being well received and the farmers expected to implement either immediately or in the short term. Moving from conservation tillage to continuous no-till was almost universally desirable among farms, with many participants experimenting with winter radish to improve drainage and avoid the need for any tillage. Reducing and eventually discontinuing the use of poultry litter on high soil test phosphorous fields was also seen by farmers as in their long term business interest considering the increased regulatory attention to phosphorous.

The following tables break down the average reduction percentage in the Existing and CIP scenario by farm type for nitrogen and phosphorous. Although the average reduction for nitrogen was similar among farm types in the Existing scenario, the range of reduction within each type was significant in the groups with more than a few members. There was greater variance among the farm types for phosphorous reduction percentage with beef farms averaging the highest percentage at 38% and poultry farms the lowest at 19%.

As far as the CIP scenario is concerned, WSI was able to develop CIPs more aggressively to reduce phosphorous than for nitrogen. The average farm would further their reductions through CIP implementation by 21% for phosphorous, compared to 14% for nitrogen. WSI is finding it is more difficult to convince farmers to adopt nitrogen reduction strategies because high amounts of reduction usually mean that we are asking them to make significant changes to production systems by

converting more land to perennial crops and/or reducing nutrient applications to small grain silage crops in their double crop system. Many depend on these for additional animal feed. These recommendations are still being included in CIPs but gaining farmer commitment to implement will occur over multiple CIP cycles.

As a group, dairy and dairy/poultry farms had some of the lowest existing reduction percentages, but the highest CIP reduction percentages. These farms usually had high nutrient loads due to a high percentage of land in row crops and the use of manure, especially as a fertilizer in the fall. As a result, there are many opportunities to apply a variety of BMPs to reduce their nutrient load.

Percentage Reduction from No BMP to Existing for Nitrogen and Phosphorous

Farm Type	# of Farms	Total Nitrogen				Total Phosphorous			
		Average	Median	Range-Low	Range-High	Average	Median	Range-Low	Range-High
Beef	7	22%	15%	9%	42%	38%	34%	11%	71%
Beef-Poultry	13	17%	15%	6%	34%	26%	23%	12%	49%
Dairy	21	17%	16%	5%	36%	26%	19%	8%	48%
Dairy-Beef	2	18%	18%	9%	27%	21%	21%	21%	21%
Dairy-Poultry	2	15%	15%	14%	15%	20%	20%	18%	22%
Poultry	5	14%	12%	8%	19%	19%	19%	12%	26%
ALL	**50**	**17%**	**16%**	**5%**	**42%**	**26%**	**22%**	**8%**	**71%**

Percentage Reduction from No BMP to CIP for Nitrogen and Phosphorous

Farm Type	# of Farms	Total Nitrogen				Total Phosphorous			
		Average	Median	Range-Low	Range-High	Average	Median	Range-Low	Range-High
Beef	7	31%	25%	16%	56%	51%	52%	31%	71%
Beef-Poultry	13	26%	26%	12%	37%	45%	45%	31%	60%
Dairy	21	34%	33%	23%	43%	46%	47%	17%	53%
Dairy-Beef	2	28%	28%	23%	34%	40%	40%	32%	49%
Dairy-Poultry	2	34%	34%	27%	41%	52%	52%	49%	54%
Poultry	5	31%	35%	18%	39%	46%	42%	40%	53%
ALL	**50**	**31%**	**32%**	**12%**	**56%**	**47%**	**47%**	**17%**	**71%**

Nutrient Reductions: The following tables show the nutrient reductions that will be achieved when the 50 CIPs are fully implemented in total pounds and percent reduction of nitrogen and phosphorous. The first assessment of progress in CIP implementation will be in 2013. At that time, existing loads will be updated and CIPs will be revised to move the farms closer to reaching the 55% nutrient

reduction goal. All loads and reduction estimates presented were calculated using the WSI Nutrient Load Estimator (NLE).

Load Reduced from Existing Scenario to CIP Scenario by Farm Type

Farm Type	# of Farms	TN (EOS lbs)		TP (EOS lbs)	
		Average	Total	Average	Total
Beef	7	854	5,975	59	415
Beef-Poultry	13	1,297	16,862	137	1,781
Dairy	21	3,129	65,712	296	6,223
Dairy-Beef	2	1,975	3,950	225	450
Dairy-Poultry	2	1,248	2,497	181	363
Poultry	5	1,203	6,016	100	502
ALL	**50**	**2,020**	**101,393**	**195**	**9,735**

A total of 101,393 lbs of nitrogen and 9,735 lbs of phosphorous are estimated to be reduced from the edge of stream nutrient loads when the current CIPs are fully implemented. The highest average reduction is expected from dairy operations where substantial potential for additional BMP implementation exists. Beef operations, in contrast, have less potential for additional nutrient reductions because they are usually inherently low loading unconfined operations unless they include a confinement feeding operation.

Percentage Reduction from Existing to CIP

Farm Type	# of Farms	TN (EOS)				TP (EOS)			
		Average	Median	Range-Low	Range-High	Average	Median	Range-Low	Range-High
Beef	7	12%	13%	0%	30%	19%	20%	0%	34%
Beef-Poultry	13	12%	12%	3%	23%	26%	25%	1%	41%
Dairy	21	20%	18%	9%	36%	25%	32%	1%	44%
Dairy-Beef	2	13%	13%	10%	16%	25%	25%	14%	36%
Dairy-Poultry	2	23%	23%	15%	30%	39%	39%	37%	41%
Poultry	5	20%	25%	7%	30%	33%	34%	22%	41%
ALL	**50**	**16%**	**15%**	**0%**	**36%**	**26%**	**29%**	**0%**	**44%**

The average reduction percentage upon CIP implementation will be an additional 16% for nitrogen and 26% for phosphorous. Beef operations tended to have the lowest reduction percentage primarily because they had low loads at “No BMP” and “Existing” conditions so options for additional reductions were limited. There was one beef farm that has 0% change between Existing and CIP

because they have already implemented all of the BMPs that are applicable to the operation, even converting over 25% of the acreage to forest buffer. Based on our observations during the pilot project, we designated certain perennial based farms as low load farms that we would not expect to achieve an additional 55% reduction. In the future, we think either this approach or perhaps better, an "acceptable" TMDL load (at the land river segment?) needs to be identified for each agricultural land use so the total "acceptable load from a farm can be calculated and used as the target to meet TMDL expectations. This would mean that some "low load" farms are at or below expected TMDL loads while many have a long way to go. It would appear to provide a more equitable approach across all farms but could be burdensome on intense confined animal operations.

Most common BMPs: The following table is a collection of the most common BMPs recommended in CIPs and the total amount that was recommended for the group of 50 farms as a whole. Most dairies rely on fall applied manure to small grains that they harvest in the spring for silage. As a result, almost all of their CIPs include a recommendation to increase liquid manure storage capacity and discontinue the fall application of manure. Various strategies were suggested to achieve expanded storage capacity including the use of a dry pack barn to store manure in a dry state that is easily transferrable to expanding their use of grazing in the spring and fall when grass growth is at its maximum.

Most farmers consider themselves no-till farmers, but they may use some type of tillage every few years to deal with hardpan issues in various fields and removal of nearly all above ground biomass such as corn or small grain silage which results in near bare soil "no-till" after harvest. The expanding use of winter radish interspersed as a cover crop offers an opportunity for these farmers to improve drainage and transition to continuous no-till. This has both water quality and carbon sequestration benefits and many participants will be experimenting with radish in the winter of 2011/2012.

The issue of buffers and stream fencing is of interest to WSI because the efficiency used by the Chesapeake Bay Model is based on a 100 foot wide, three stage buffers and an average stream fencing width of 15 feet. The existing buffers we see on farms usually meet the minimum width requirement of 35 feet but receive nutrient reduction credits as if they were the wider buffers defined by the Bay Program. For example, among the 50 farms in the Pilot Program, 12 farms have fenced out their streams at greater than 35', accounting for 151 total acres of forest and grass buffer. Most are 35 foot wide. Thirteen farms have fenced out streams at less than 35 feet for a total of 21.4 acres of streamside protection. Many of these are "top of bank" fencing which clearly has benefits but is far less than the 15 feet width assumed and quite subject to loss since they are literally on the top of the stream bank.

In total, WSI recommended the implementation of about 100 acres of forest and grass buffers in the 50 CIPs developed for this project. The last column in the table is negative because it represents 14.5 acres of existing stream fencing that is currently less than 35 feet wide. Our recommendation is to convert these areas to >35 wide buffers.

New BMPs in CIP (Acres in CIP Scenario minus Acres in Existing Scenario)

Farm Type	Total # of Farms	Commodity Cover Crops (All types) Acres	Cover Crops (All Types) Acres	Continuous No-Till Acres	Grass Buffers* Acres	Stream Fencing ≥35 ft wide (Forest Buffer) Acres	Stream Fencing ≥35 ft wide (Grass Buffer) Acres	Stream Fencing <35 ft wide (Grass Corridor) Acres
Beef	7	0	93	77	0	1	21	-11
Beef-Poultry	13	200	98	484	7	0	31	0
Dairy	21	1771	479	3243	11	4	22	-4
Dairy-Beef	2	0	0	252	0	0	11	-3
Dairy-Poultry	2	25	0	114	0	0	5	0
Poultry	5	75	154	157	0	0.8	0	4
TOTAL	**50**	**2071**	**824**	**4327**	**18**	**5.8**	**90**	**-14**

One unexpected outcome of the project was our experience with trying to get farms to that are dominated by perennial vegetation and have low numbers of animals to reach the 55% reduction goal. These operations have a relatively low nutrient load per acre, and we categorized them as "Low Load Farms". For these farms, the nutrient load is so low to begin with that achieving a 55% additional reduction is practically impossible and an inefficient use of resources. WSI will continue to work with Virginia officials as they try to reconcile how to make reduction goals for agriculture equitable, but also fair to operations of this type. To qualify as a WSI Low Load Farm, one must have implemented the VA five priority practices and be dominated by perennial land uses. The criteria are as follows:

- Land dominated by perennial crops at >60% of acreage – including buffer acreage
- Absence of denuded pasture feeding areas
- On all row crop fields, full implementation of Virginia five priority practices
    - Nutrient Management
    - Cover crops – may receive <40 lbs N /A of fall-applied liquid manure *if storage is an issue*
    - All streams through pastures are fenced with a minimum of 35 foot buffer
    - All streams adjacent to crop land have buffers >35 feet, preferably >50 feet
    - Conservation or no tillage on row crops

Verification of Conservation Implementation: Seven participating farms agreed to get voluntary Nutrient Management Plans as the first step of CIP implementation. There was early indication at the CIP interview stage, that farmers are becoming increasingly aware of the need to reduce their soil test phosphorous levels even when not required to as part of a permit or an NMP. WSI provides each farm with a one page handout on the relationship between soil test phosphorous and the loss of

soluble phosphorous to the water table (see www.corporatewaterstewardship.org for a copy of WSI Information Sheet #1).

In response to the Old Order Mennonite community and in consideration of the Virginia Phase 1 Watershed Implementation Plan (WIP), WSI is beginning to track the existing BMPs that have been implemented voluntarily and may not be accounted for through the federal or state cost share programs.

Farmer Reward for Performance: The quantitative measurement of conservation performance embedded in the WSI program is well positioned to reward farmers for performance in water quality protection. Although official recognition and reward through the VPGC and the SVBPC may not materialize for some time, the presence of a mechanism to measure performance has already spurred action by other projects in the area. As referred to above, the Farm to Table project has budgeted money that will allow a pay for performance model to be tested based on WSI evaluations of CIP implementation. The VA Resource Management Plan program is just being developed but appears certain that farmers implementing a WSI Continuous Improvement Program should qualify for the benefits associated with the VA RMP program.

Project Evaluation

The WSI Pilot Project was successful in reaching our recruiting targets and improving the WSI assessment protocols as well as how the Nutrient Load Estimator estimates nutrient losses from various types of farm operations. All 50 participants agreed to sign their CIP and continue to work with WSI on achieving water quality protection goals. They will be visited in 2013 for their first biennial assessment where there existing reduction estimates will be updated and we will collaborate with each farmer on their next CIP.

This project, as well as two other projects in the Shenandoah Valley, will bring the total number of farms in our program to well over 100. We are currently planning our third Farmer Advisory Committee meeting for the winter of 2011/2012 and will continue to rely on them to help encourage the Virginia agriculture sector to take a proactive role in addressing water quality issues rather than waiting for regulations to be implemented.

In the fall of 2011, WSI will begin our first round of biennial assessments with our Beta Test farms that were initially evaluated in 2009. As we verify individual progress towards reaching the State goals to protect the Chesapeake Bay, we will prove the viability of a private, independent, third-party to provide the accountability necessary for reasonable assurance of compliance with the Bay TMDL. As we work with Virginia on development of their Resource Management Plans (RMP), WSI will support mechanisms for the agriculture sector to document progress made in a quantifiable way that is directly related to the Chesapeake Bay Model.

Lessons Learned

WSI continues to revise and improve NLE to better characterize the situation we see in the field with the model estimates of the Chesapeake Bay Model. The major issue we ran into in the Pilot Project is the growing number of farms that are back grounding cattle as part of their farm business. The term back grounding refers to farms where cattle are fed in a semi-confined area, often a small pasture, to raise them from about 3-400 lbs to about 6-700 lbs. The result is a land use that is heavily denuded and poses a unique risk to water quality. There is currently no equivalent land use load within the Chesapeake Bay Model, so WSI created a land use load and three BMPs and estimated practice efficiencies that could be applied to address the situation.

Dissemination

WSI conducted four barn meetings with the local Old Order Mennonite community to recruit farms into the WSI program and to discuss the EPA TMDL and what WSI believes were the priority risks to water quality that we see in the field. Meetings often ran for several hours and over a dozen of the Pilot Program participants were recruited in this fashion. Now that we have completed the Pilot Program, WSI will be visiting with these communities again in the fall of 2011 to report on the aggregated results of the program.

WSI has formed a Farmer Advisory Committee (FAC) to provide feedback to WSI on our program and to help promote the program and disseminate information about participation to other farmers. This has provided valuable direction and feedback to WSI and has really helped "spread the word" about our program in the Valley. Given the word of mouth dissemination of information in general in the farm community, and particularly among Old Order communities, we feel the FAC is critical to our success and future expansion. WSI held two FAC meetings to report on progress and get feedback on what in the WSI program was working well and what could be improved upon. Multiple revisions to our CIP document and how we communicated the BMP recommendations resulted from these meetings. The FAC also continues to advise WSI on how we can balance the delicate roles of providing confidential independent assessments of conservation performance and providing valuable perspective to policy discussions on the best strategy towards achieving water quality protection goals.

WSI continues to meet regularly with the staff of the Chesapeake Bay Program to report on issues like the denuded pasture land use. WSI is working with staff to make sure that our approach is reasonable and also to build the case for improving the Bay model in the future to better characterize the agriculture sector and thereby improving the estimated reductions achieved and still needed to protect the Chesapeake Bay.