NEW YORK CITY DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WATER SUPPLY

Watershed Agricultural Program
Evaluation of Current Evaluation Criteria

December 31, 2010

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1. Background

The Watershed Agricultural Program (WAP) is a voluntary pollution prevention partnership that is administered locally by the Watershed Agricultural Council (WAC) in cooperation with local, state and federal partner agencies/organizations. The WAP represents one of DEP's oldest watershed protection programs and actually pre-dates the 1997 New York City Watershed Memorandum of Agreement (MOA). Originally pilot tested at ten watershed farms during 1992-1994, the WAP was formally expanded in 1994 with a goal of enrolling 85% of all large commercial farms in the Catskill/Delaware (West of Hudson) Watersheds.

The original 85% participation goal was met and exceeded as the WAP matured and expanded over the course of nearly two decades. Major programmatic milestones include the addition of a WAC Agricultural Easement Program in 1997; incorporation of the federal Conservation Reserve Enhancement Program (CREP) in 1998; expansion to the East of Hudson Watershed and addition of a Small Farms Program in 2000; and the ongoing refinement of both a Farmer Education Program and Agricultural Economic Viability (Farm to Market) Program. Although distinct from the WAP programmatically, DEP has also partnered with WAC since 1997 to administer and implement the complimentary Watershed Forestry Program.

Currently, the WAP is one component of DEP's Long-Term Watershed Protection Strategy as well as a mandate pursuant to the 1997, 2002, and 2007 Filtration Avoidance Determinations (FADs) for the Catskill/Delaware Water Supply. Excluding the WAC Agricultural Easement and Forestry Programs, DEP has committed more than $116 million to the WAP during the cumulative period September 1992 through October 2012. During this same period, DEP and WAC have leveraged more than $23 million in federal, state and private funding to support the WAP through grants, appropriations, and technical assistance.

The 2007 FAD contains a number of enhancements to the WAP, including the development of a programmatic strategy for replacing aging/failing best management practices (BMPs); expansion of the Nutrient Management Credit Program to approximately 80 farms in the Cannonsville Reservoir basin; formal evaluations of the CREP, Small Farms Program, and Delaware County Precision Feed Management Program; and a new revised metric (originally introduced in the 2002 FAD) that requires that 90% of all large farms in the West of Hudson Watershed have "substantially implemented" Whole Farm Plans by September 30, 2010. According to the FAD, this latter metric has the potential to be revisited and revised as the WAP matures and additional information becomes available.

2. Evaluation Overview

The 2007 FAD requires DEP to review current WAP evaluation criteria with input from the WAC Advisory Committee and submit a report by December 31, 2010. In January 2010, DEP and WAC agreed to a year-long evaluation timeline that would maximize input from the various WAP partner agencies and allow time for thoroughly assessing cumulative program

accomplishments. The 2010 evaluation focused exclusively on the WAP's accomplishments in the Catskill/Delaware Watersheds since this is the portion of the water supply system regulated by the FAD and is also where the majority of watershed farms are located.

As a first step, the WAP Action Staff – comprised of DEP, WAC, Cornell Cooperative Extension (CCE), Delaware County Soil & Water Conservation District (SWCD), and the USDA Natural Resources Conservation Service (NRCS) – reviewed the current evaluation criteria and recommended a proposal in March 2010 to the broader WAC Agricultural Committee. This proposal, which had been jointly developed by all of the WAP partner agencies during 2008-2009, focused on the implementation of a new BMP Prioritization Methodology once the 90% "substantially implemented" FAD metric was achieved.

Second, DEP compiled a comprehensive report documenting the WAP's cumulative accomplishments, historical trends in agriculture, and a summary of major scientific research conducted in relation to the WAP. This information was reviewed extensively with the WAP Action Staff and WAC Agricultural Committee during July through September, and it was used to develop a series of recommendations and proposed new WAP metrics. In October, DEP and WAC presented their recommendations to the WAC Advisory Committee for their review and deliberation. The Advisory Committee was subsequently solicited for their additional input. Although written comments were only received from EPA and DOH, the WAC Advisory Committee expressed their broad verbal support for the WAP evaluation recommendations.

2.1 History of the WAP Evaluation Criteria

In 1997, DEP and WAC developed basic evaluation criteria and an evaluation strategy for the WAP with input from the WAC Advisory Committee. In 1999, the WAP evaluation criteria were streamlined into the following five major categories:

1. Farmer Participation;
2. Farmer Acceptance, Implementation and Maintenance of Whole Farm Plans;
3. Reduction of Phosphorus and Parasite Loading Risk from Farm to Watercourse;
4. Efficacy of Whole Farm Planning and the Implementation Process; and
5. Science of Whole Farm Planning.

During the period 1997-2005, the WAP has been evaluated every two years based on the above criteria. DEP also evaluated the WAP evaluation criteria with input from the WAC Advisory Committee and submitted a FAD report in December 2005. That report suggested new approaches for measuring and characterizing the WAP's effectiveness in light of its voluntary nature, cumulative investments to date, and the ongoing transition from an intensive planning and implementation phase to a desired future program that relies more heavily on continued operation and maintenance. Among the report's recommendations, DEP noted:

- The long-standing institutional relationships developed between DEP, WAC, program partners, and watershed farmers should continue to be viewed positively as an important indicator of success.
- Future evaluations will require a greatly improved and expanded database of both farm-specific and landscape-level data. (Note: WAC undertook a comprehensive database

project in 2008 that is nearing completion in 2010 and should be fully operational in 2011. This database will provide a valuable tool for future WAP evaluations.

- The Annual Status Review process should continue to be utilized as a tool for measuring and tracking the efficacy of the Whole Farm Planning and implementation processes.
- The WAP should continue tracking and compiling relevant scientific research that documents water quality improvements associated with agricultural BMPs.
- Basic evaluation criteria are deemed to be sound and additional performance measures might include: treated acres relative to total agricultural acres; heard health data; livestock types and animal units; excluded cattle from streams; riparian buffer acres established; manure storage/spreading data; and historical trends in agriculture. Some of these indicators might better reflect the WAP's true impact at the landscape scale.

In March 2006, DEP submitted a *Watershed Protection Program Summary and Assessment FAD Report* in which several positive water quality improvements – particularly phosphorus in the Cannonsville Reservoir – were attributable in part to the WAP as well as wastewater treatment plant upgrades. The report concluded that independent of watershed management activities, significant loading reductions of phosphorus were predicted due to a declining number of farms and agricultural land uses in the watershed, and these reductions could potentially be doubled when watershed management programs are considered. DEP believes that declining agricultural land uses should be one consideration as the WAP develops new goals and metrics for the future.

In January 2008, DEP submitted its WAP Five-Year Plan which reflected the scope of work in the current 42-month DEP contract with WAC. The main objective of this Five-Year Plan was to lay the groundwork for completing the transition from an aggressive planning and implementation phase to a more cost-effective program that focuses on Whole Farm Plan maintenance and the prioritized implementation of both new and replacement BMPs.

3. Regional Trends in Agriculture

The universe of farms in the Catskill/Delaware Watersheds has changed dramatically since the inception of the WAP in the early 1990s. The regional dairy industry has experienced significant economic challenges, and the number of large commercial farms has declined. When the original WAP goal of 85% voluntary participation was first established, approximately 350 eligible large farms were identified. Today that universe is reported as 265 known large farms (excluding sub-farms), of which 255 farms are WAP participants and 249 have Whole Farm Plans. However, at least 64 farms (about one-quarter) have since become inactive which essentially leaves 191 active large farms participating in the WAP.

Table 1 provides an historical summary of agricultural land for participating large farms as derived from their Whole Farm Plans. The data suggests that between 1997 and 2009, total cropland acreage increased by only 13% whereas total woodland acres increased by 14%, total pasture increased by 23%, and total hayland increased by 144%. Put another way, cropland represented 22% of the total agricultural acreage in 1997 compared with 18% in 2009, whereas the relative percentage of hayland acres was 14% in 1997 and 25% in 2009.

Table 1. Historical summary of agricultural land in approved Whole Farm Plans for large farms participating in the WAP.

	1997	1999	2001	2003	2005	2009
Total Cropland:	12,007	20,555	13,561	14,262	15,251	13,543
% Owned	62.5	40.2	63.6	60.8	70.4	70.9
% Rented	37.5	59.8	36.4	39.2	29.6	29.1
Total Hayland:	7,840	11,412	17,147	18,032	18,115	19,152
% Owned	51.0	50.5	46.4	45.1	47.9	49.6
% Rented	49.0	49.5	53.6	54.9	52.1	50.4
Total Pasture:	15,291	16,550	18,988	19,311	19,227	18,836
% Owned	62.6	72.3	73.4	73.8	77.0	78.2
% Rented	37.4	27.7	26.6	26.2	23.0	21.8
Total Woodland:	20,421	24,607	24,927	26,408	25,988	23,174
% Owned	86.6	86.6	84.8	85.6	91.0	89.7
% Rented	13.4	13.4	15.2	14.4	9.0	10.3
Total Agricultural Acres:	55,551	73,124	74,623	78,013	78,581	76,745

Table 2 provides an historical summary of animal census data for participating large farms as derived from their Whole Farm Plans. The data suggests that the total number of animals declined from 28,408 animals in 1997 to 17,478 animals in 2009, a 39% decrease. Most significant is the decline of dairy animals during this period from 21,394 animals in 1997 (mature dairy plus dairy heifers) to only 11,650 animals in 2009, a dramatic 46% decline.

Table 2. Historical summary of animal census data as reported in Whole Farm Plans for large farms participating in the WAP.

	1997	1999	2001	2003	2005	2009
Mature Dairy	12,636	10,625	12,160	7,848	7,607	6,002
Dairy Heifers	8,758	7,494	8,779	6,985	6,971	5,648
Veal	790	630	951	762	823	0
Beef	1,566	1,214	2,268	1,413	2,254	2,490
Sheep	569	425	862	544	594	421
Goats	78	63	306	250	251	230
Pigs	68	185	209	199	272	289
Horses	565	475	762	604	940	512
Chickens	2,655	2,606	4,895	21,129	5,709	1,565
Pheasants	250	300	300	250	0	40
Rabbits	25	100	110	50	100	95
Emu/Ostrich	18	22	47	83	49	0
Llama/alpaca	55	74	89	82	4	29
Deer	375	380	404	154	135	157
Total Animals:	28,408	24,593	32,142	40,353	25,709	17,478

According to the USDA Census of Agriculture, which compiles and releases detailed data every five years, the five West of Hudson Watershed counties have collectively experienced a 10.5% decline (50,342 acres) in total farmland during the period 1992-2007, with Schoharie

and Delaware County declining the most (18.9% and 13.8% respectively). During this same period, average farm size also declined by about 17% (36 average acres per farm), with Greene and Schoharie Counties declining the most (25% and 20% respectively) followed by Delaware and Sullivan (17% and 15% respectively). The USDA also documents that total cropland decreased by 24.5% (65,210 acres) for all five West of Hudson Watershed counties, with Delaware and Schoharie Counties each declining by 29%. In summary, the USDA data confirms that the apparent shift in agricultural activities as documented in Whole Farm Plans is not limited to or caused by local conditions but are actually in line with broader regional trends.

Table 3 depicts the total number of farms in the five West of Hudson Watershed counties as well as the number and percentage of these operations where farming is identified as the primary occupation. The data suggest that while the total number of farms appears to have increased 8.6% during 1992-2007, the total number of operations where farming is the primary occupation only increased by 0.7% (nine farms). In Delaware, Sullivan and Schoharie Counties, the number of primary occupation farms actually decreased. These trends suggest that a significant number of identified farms are not the primary occupation for the landowner.

Table 3. Total number of farms in the five West of Hudson counties that comprise the Catskill/Delaware Watersheds. (Source: USDA Census of Agriculture)

	1992	1997	2002	2007	Net Δ (%)
Delaware County:	716	717	788	747	+ 4.3
Primary occupation:	481	428	497	437	- 9.1
% of total:	67.2	59.7	63.1	58.5	
Greene County:	222	244	342	286	+ 28.9
Primary occupation:	105	114	192	145	+ 38.1
% of total:	47.3	46.7	56.1	50.7	
Schoharie County:	516	518	579	525	+ 1.7
Primary occupation:	320	311	333	303	- 5.3
% of total:	62.0	60.0	57.5	57.7	
Sullivan County:	306	311	381	323	+ 5.6
Primary occupation:	190	194	243	164	- 13.7
% of total:	62.1	62.4	63.8	50.8	
Ulster County:	433	409	532	501	+ 15.7
Primary occupation:	248	234	341	286	+ 15.3
% of total:	57.3	57.2	64.1	57.1	
TOTAL:	2,193	2,199	2,622	2,382	+ 8.6
Primary occupation:	1,344	1,281	1,606	1,335	+ 0.7
% of total:	61.3	58.3	61.3	56.0	

Table 4 provides a breakdown of farms by market value of agricultural products. Farms with agricultural incomes greater than $10,000 per year are generally considered large farms, while farms making $1,000 to $10,000 are generally considered small farms. The data indicates that for all five watershed counties, large farms decreased by 3.9%, small farms decreased by

11%, and farms making less than $1,000 – which may or may not qualify as small farms depending upon several factors – increased by 110.8%. Delaware County experienced the greatest decline in large farms (19.3%) while Schoharie and Sullivan Counties experienced the greatest decline in small farms (24.8% and 21.2% respectively). This data further confirms that the watershed agricultural landscape is changing, with larger commercial farms being replaced by smaller farming operations making less than $1,000 annually.

Table 4. Total number of farms, based on market value of agricultural products sold, in the five West of Hudson counties that comprise the Catskill/Delaware Watersheds. (Source: USDA Census of Agriculture)

	1992	1997	2002	2007	Net Δ (%)
Delaware County:	716	717	788	747	+ 4.3
< $1,000 in sales:	83	81	197	181	+ 118.1
$1,000-$9,999 in sales:	202	255	233	218	+ 7.9
> $10,000 in sales:	431	381	358	348	- 19.3
Greene County:	222	244	342	286	+ 28.9
< $1,000 in sales:	31	34	89	79	+ 154.8
$1,000-$9,999 in sales:	103	111	145	104	+ 1.0
> $10,000 in sales:	88	99	108	103	+ 17.0
Schoharie County:	516	518	579	525	+ 1.7
< $1,000 in sales:	68	48	122	111	+ 63.2
$1,000-$9,999 in sales:	206	219	207	155	- 24.8
> $10,000 in sales:	242	251	250	259	+ 7.0
Sullivan County:	306	311	381	323	+ 5.6
< $1,000 in sales:	49	39	113	90	+ 83.7
$1,000-$9,999 in sales:	113	117	116	89	- 21.2
> $10,000 in sales:	144	155	152	144	0
Ulster County:	433	409	532	501	+ 15.7
< $1,000 in sales:	57	39	150	146	+ 156.1
$1,000-$9,999 in sales:	169	174	172	140	+ 17.2
> $10,000 in sales:	207	196	210	215	+ 3.9
TOTAL:	2,193	2,199	2,622	2,382	+ 8.6
< $1,000 in sales:	288	241	671	607	+ 110.8
$1,000-$9,999 in sales:	793	876	873	706	- 11.0
> $10,000 in sales:	1,112	1,082	1,078	1,069	- 3.9

4. Summary of WAP Accomplishments

DEP believes that the opportunity to reflect on the WAP evaluation criteria should consider the program's evolution and expansion from a Whole Farm Planning pilot program being scientifically tested at 10 demonstration farms to a watershed-wide program that is supported by nearly two decades of practical field experience at a cost approaching $140 million in City and federal dollars. As the WAP transitions from an aggressive planning and

implementation phase to a desired future effort focused more on Whole Farm Plan maintenance and BMP prioritization, it is important to recognize the program's accomplishments as context for evaluating the current WAP evaluation criteria. For the purpose of this report and to ensure a consistent analysis, all WAP accomplishments are summarized through 2009 only.

4.1 Whole Farm Planning

Through 2009, and excluding the designation of sub-farms, 255 of the 266 known large farms in the West of Hudson Watersheds have signed up for the WAP (96% participation) and 249 of these participants (98%) have Whole Farm Plans. Only a dozen known large farms are not WAP participants. In addition, 265 small farms completed Tier I questionnaires through 2009 (this represents the current known universe of small farms), of which 75 farms have Whole Farm Plans (28%). Figure 1 depicts the development of Whole Farm Plans on both large and small farms during 1993-2009. As the WAP moves forward, the large farm planning focus will shift to annual status reviews and maintenance/revisions of existing plans, while the small farm focus will continue to be the development of new plans and the maintenance of existing plans.

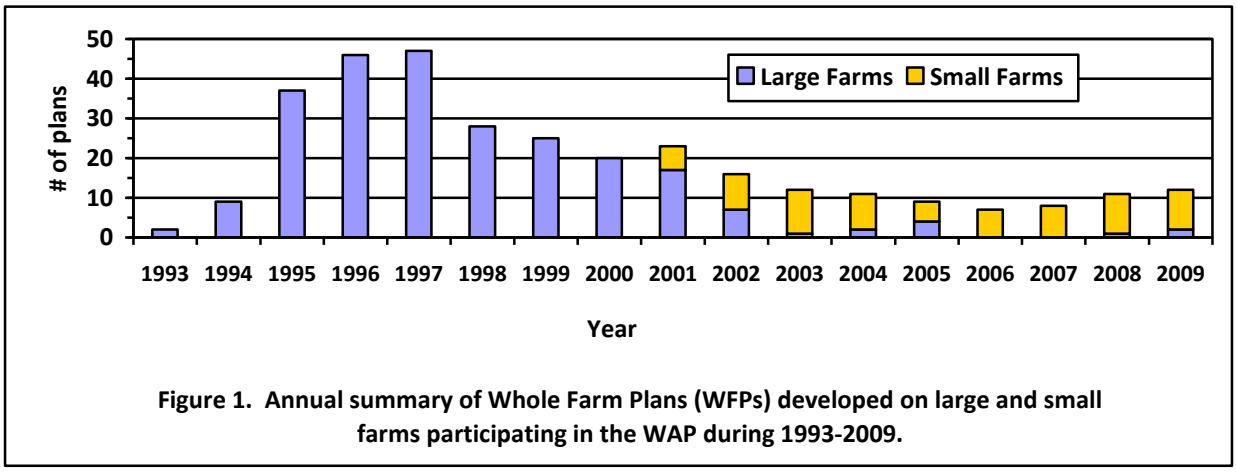

Figure 1. Annual summary of Whole Farm Plans (WFPs) developed on large and small farms participating in the WAP during 1993-2009.

Table 5 depicts the geographic distribution of both large and small Whole Farm Plans throughout the West of Hudson Watersheds. The majority of watershed farms (more than 80%) are located in Delaware County and, more specifically, the Cannonsville Reservoir basin.

Table 5. Geographic distribution of all WAP participants with Whole Farm Plans in the West of Hudson (Catskill/Delaware) Watersheds as of December 31, 2009.

County	Large Farms		Small Farms		Total Farms	
	#	%	#	%	#	%
Delaware	207	83.1	62	82.7	268	83.0
Greene	20	8.1	6	8.0	26	8.0
Schoharie	7	2.8	4	5.3	11	3.4
Sullivan	8	3.2	2	2.7	10	3.1
Ulster	7	2.8	1	1.3	8	2.5
Total	249	100.0	75	100.0	323	100.0

With particular respect to small farms, the 2007 FAD requires the WAP to develop ten new plans every year. The 75 small farm plans completed through 2009 represent 10,954 agricultural acres, including 221 acres of cropland (2%), 3,123 acres of hayland (29%), 3,636 acres of pasture (33%), and 3,974 acres of woodland (36%). These 75 small farm plans also represent 7,992 total animals, the majority of which are poultry (66%) followed by beef (11%), goats (6%), horses (5%), and pigs (4%). Dairy livestock only represent 2% of the total number of animals. As DEP noted in its *2009 Small Farms Assessment FAD Report*, because small farms tend to have fewer and different types of animals, this effectively lowers their animal units (one animal unit equals 1,000 pounds of livestock) which in turn results in less manure to manage and potentially less risk to water quality.

4.2 BMP Implementation

Through 2009, the WAP has supported the construction and implementation of more than 5,169 BMPs on West of Hudson large and small farms at a total direct cost of more than $34.5 million (excluding WAP staff costs and administrative expenses). As summarized in Table 6, these figures are comprised of 712 BMPs implemented on small farms at a total cost of $2.7 million, and 4,457 BMPs implemented on large farms at a total cost of $31.8 million. Although most BMPs address multiple Whole Farm Plan pollutant categories, it is worth noting that those BMPs implemented in the greatest numbers – such as nutrient management plans, fencing, manure spreading equipment, barnyard water management systems – are specifically designed to reduce risk from the highest priority pollutant categories (parasites and nutrients).

Table 6. Number of BMPs implemented on large farms (1993-2009) and small farms (2002-2009) participating in the WAP.

NRCS Code	BMP Name	Large Farm	Small Farm
193/759	Waste Field Storage/Manure Pile Area	43	0
312	Waste Management System	42	5
313	Waste Storage Structure	66	0
314	Brush Management	21	1
317	Manure Composting Facility	0	1
326	Stream Intervention	7	0
327	Conservation Cover	7	0
328	Conservation Crop Rotation	111	0
329	Conservation Tillage	5	0
340	Cover & Green Manure Crop	20	1
342	Critical Area Planting	12	3
362	Diversion	80	13
367	Waste Facility Cover	1	0
382	Fencing	359	109
391	Riparian Forest Buffer	121	13
393	Filter Strip	77	0
411	Grasses and Legumes in Rotation	8	0
412	Grassed Waterway	12	1
447	Silage Leachate Management	2	0

468	Lined Waterway	21	0
500	Obstruction Removal	12	0
512	Pasture and Hayland Planting	46	2
528a	Prescribed Grazing	70	0
558	Roof Runoff Management	30	8
560	Access Road	115	25
561	Heavy Use Area Protection	100	29
574/516/378	Spring Development/Pipeline/Pond	241	97
575	Animal Trails and Walkway	182	46
578	Stream Crossing	2	0
580	Streambank Protection	19	2
585	Contour Stripcropping	6	0
586	Field Stripcropping	22	0
587	Structure for Water Control	12	13
590	Nutrient Management Plan	735	112
595	Pesticide Management	43	0
606	Subsurface Drain	91	0
612	Tree & Shrub Planting/Natural Regeneration	228	40
614	Watering Facility	64	8
620	Underground Outlet	22	10
633	Waste Utilization	474	88
634	Waste Transfer System	30	0
702	Agrichemical Mixing Facility	1	0
707	Barnyard Water Management System	204	16
748	Record Keeping	353	37
749	Manure Pile Area	0	20
n/a	Roofed Barnyard	6	6
n/a	Manure Storage – Covered	0	2
n/a	Calf Housing Structure	34	1
n/a	Calf Hutches/Kennel	13	0
n/a	Barn Ventilation	13	0
n/a	Farm Fueling Facility	16	0
n/a	Manure Spreading Equipment	243	1
n/a	Farm Dump Cleanup	5	1
n/a	Pesticide Handling Facility	5	0
n/a	Bridge Replacement	5	0
	Total Number of BMPs Implemented:	4,457	712
	Total Cost of BMPs:	$31,830,584	$2,764,030

4.3 Nutrient Management Plans (NMPs)

Through 2009, a total of 167 active large farms (90%) and 59 small farms in the West of Hudson Watershed are following NMPs, which are designed to manage the amount, source, placement, form, and timing of the application of nutrients from fertilizer, manure, and other organic sources. Figure 2 summarizes the number of NMPs that have been developed on participating small and large farms during 1998-2009.

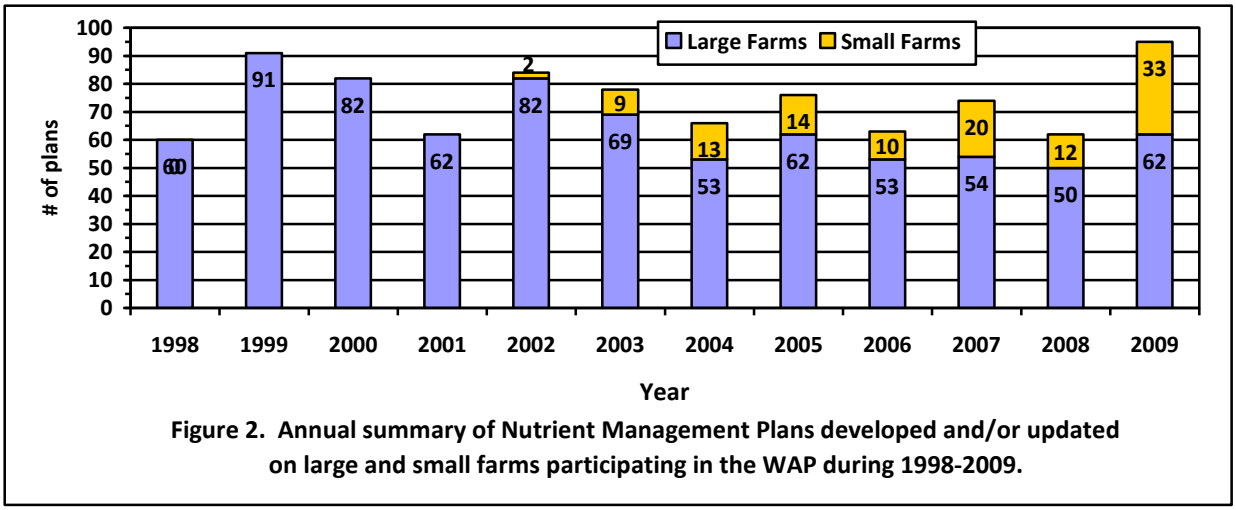

Figure 2. Annual summary of Nutrient Management Plans developed and/or updated on large and small farms participating in the WAP during 1998-2009.

Figure 3 summarizes the annual status of NMPs on large farms during 2004-2009. It is important to recognize that NMPs developed within the past three years are considered to be current. In 2009, 157 of the 167 NMPs on active large farms were developed within the last three years (94%) and they represent 13,952 animal units (93% of total). For the past few years more than 90% of all large farms with NMPs have maintained their plans in a current status.

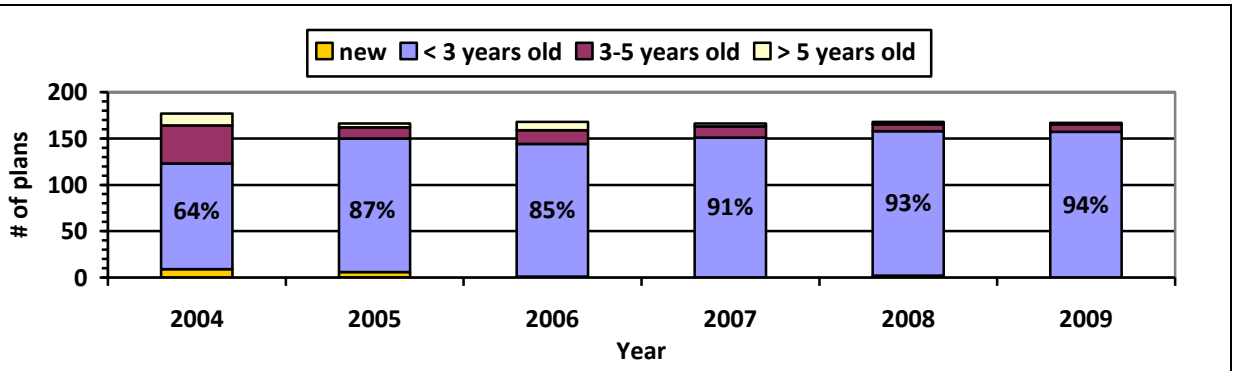

Figure 3. Status of Nutrient Management Plans on active large farms participating in the WAP during 2004-2009.

4.4 Annual Status Reviews

The 2007 FAD requires that annual status reviews be completed on all large farms with "substantially implemented" Whole Farm Plans. The WAP conducts two types of status reviews: Basic and Comprehensive. During a Basic Status Review, WAP staff meet with farmers annually to review their Whole Farm Plan and determine if they are experiencing any problems, if any new environmental issues exist, or if any farm operation changes are planned. During the Comprehensive Status Review – conducted every four years or whenever a Whole Farm Plan revision is triggered – WAP staff inspects all BMPs onsite, review all BMP operation and maintenance agreements with the farmer, and document all maintenance issues with

timelines to correct deficiencies. Figure 4 documents the total number of annual status reviews conducted on large and small Whole Farm Plans during 1998-2009.

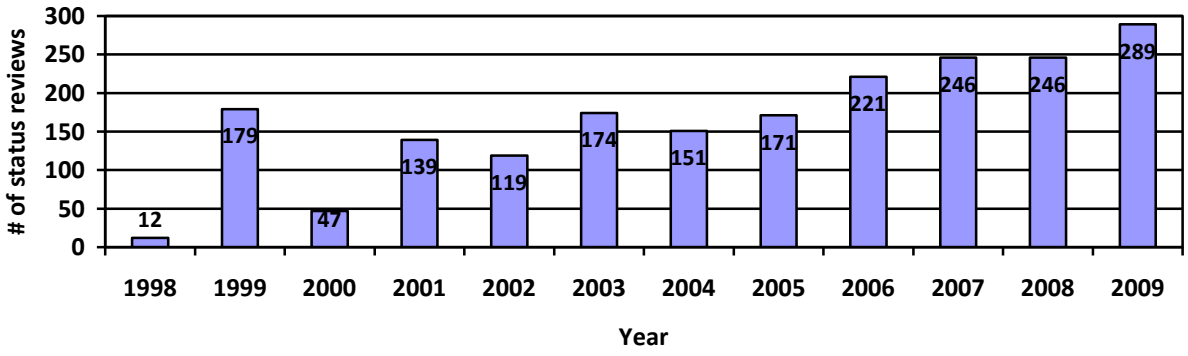

Figure 4. Total number of Whole Farm Plan annual status reviews conducted by the WAP during 1998-2009.

4.5 Conservation Reserve Enhancement Program (CREP)

Through 2009, 160 farmers have signed 184 CREP contracts representing 1,974 acres of riparian buffers. In terms of WAP participants, 107 of the 249 large farms (43%) and 22 of the 75 small farms (29%) are enrolled in CREP, which has excluded nearly 11,000 head of livestock from Catskill/Delaware streams. Table 7 summarizes annual CREP enrollment and expenses. The grand total for implementing CREP in the Catskill/Delaware Watersheds during 1999-2009 has been $14,222,436, of which the total WAC/DEP portion amounts to $4,795,968 (34%).

Table 7. Summary of CREP contracts by federal fiscal year 1999-2009.

FFY	Contracts (#)	Acres Enrolled	USDA Commitment	WAC Commitment
1999	4	42.0	$75,743	$42,021
2000	8	59.4	$825,580	$386,275
2001	27	302.0	$1,108,323	$467,011
2002	56	667.2	$2,412,063	$1,153,150
2003	16	159.6	$1,191,237	$694,999
2004	17	125.8	$893,021	$434,189
2005	18	247.5	$997,800	$561,123
2006	10	77.8	$287,981	$316,810
2007	4	23.0	$410,737	$293,515
2008	12	161.1	$626,791	$225,010
2009	12	108.2	$477,512	$221,801
Total	184	1,973.6	$9,426,468	$4,795,968

4.6 Farmer Education Program

The WAP provides farmers with a range of education programs such as workshops, classroom instruction, farm tours, and trainings that address Whole Farm Plans, nutrient and pathogen management, and the operation and maintenance of BMPs. Figure 5 summarizes the accomplishments of the Farmer Education Program during 2002-2009. The WAP has conducted at least 95 farmer education programs that were attended by approximately 2,235 participants, of which more than half (55%) were watershed farmers. Other participants included non-watershed farmers, agri-service professionals, agency staff, students and others. Given the WAP's growing portfolio of Whole Farm Plans, ongoing support of a Farmer Education Program that attracts high levels of participation should continue to be a high priority in the future.

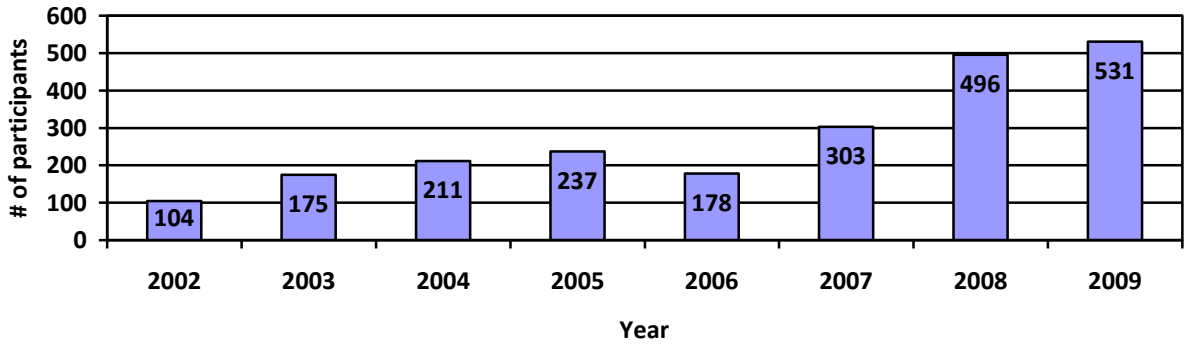

Figure 5. Annual summary of participants in the WAP Farmer Education Program.

4.7 WAC Agricultural Easement Program

To be eligible for the WAC Agricultural Easement Program, a farmer must have a Whole Farm Plan. Through 2009, about 17% of all WAP participants with Whole Farm Plans (both large and small farms) have sold conservation easements to WAC, with all but two of these conservation easements being executed on large farms. Figure 6 depicts the number of acres enrolled in WAC conservation easements during 2001-2009.

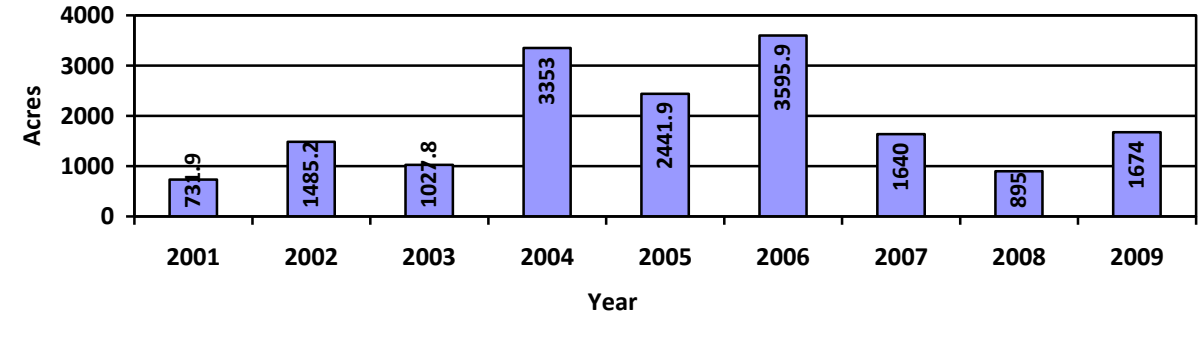

Figure 6. Annual enrollment of acres (based on closed contracts) in the WAC Agricultural Easement Program during the period 2001-2009.

4.8 WAC Forestry Program

Although not part of the WAP, the WAC Forestry Program supports the development of forest management plans for landowners having at least ten acres of forest. Figure 7 depicts the annual enrollment of landowners in WAC forest management plans during 1998-2009. A total of 802 plans were developed covering 141,113 acres. Approximately 78 of these plans (10%) overlap with WAP participants. Put another way, about 24% of all WAP participants with Whole Farm Plans (both large and small farms) also have a WAC forest management plan.

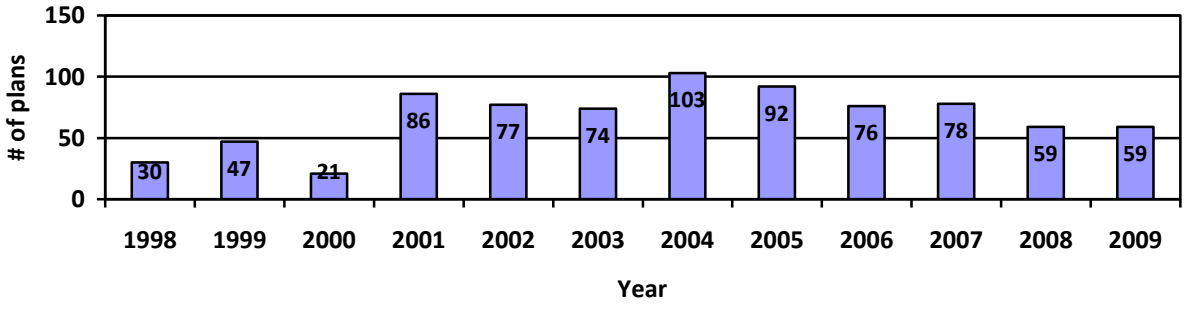

Figure 7. Annual summary of forest management plans developed through the WAC Forestry Program during the period 1998-2009.

5. Discussion of Current WAP Evaluation Criteria

In October 2010, DEP and WAC – on behalf of all the WAP partners – presented to the WAC Advisory Committee a comprehensive evaluation of current WAP evaluation criteria with recommendations for potential new metrics and performance measures. Input was received from the Advisory Committee and incorporated into this report. It is also worth noting that in 2011 the new WAC database should be functioning and operational. Refining and improving the WAC database has been a mutual goal of DEP and WAC for many years, and the database was specifically referenced in DEP's December 2005 FAD evaluation report as one tool needed to effectively document, measure and track WAP metrics and performance measures.

5.1 Farmer Participation

DEP believes that maintaining high rates of participation in a voluntary watershed protection program represents one of the most valuable and effective performances measures. As documented in this report, the WAP has achieved 96% participation of all large farms in the West of Hudson Watershed, with 98% of these participants having a Whole Farm Plan. At least 90% of all active large farms are following nutrient management plans and 94% of these plans are considered to be current. In terms of small farm participation, at least 28% of the known small farms already have Whole Farm Plans with new plans being developed every year. High numbers of farmers are attending WAP farmer education programs every year, about 17% of all WAP participants (small and large farms) are enrolled in the WAC Agricultural Easement Program, and about 24% of all WAP participants have a WAC forest management plan.

DEP recommends that the WAP continue to monitor and report on farmer participation in Whole Farm Plans, nutrient management plans, WAC forest management plans, WAC agricultural easements, farmer education programs, CREP, and other related programs. Since these programs are all voluntary in nature, however, establishing numeric annual participation goals is not recommended. Instead, DEP recommends the following metrics:

- Maintain at least 90% active large farm participation in the WAP.
- Maintain "current" nutrient management plans on 90% of all Whole Farm Plan revisions for large farm participants.
- Increase annual participation in the CREP, WAC Easement Program, and WAC Forestry Program.

Another specific change that DEP recommends with respect to farmer participation is eliminating the "sub-farm" designation when tracking WAP accomplishments. The concept of "sub-farms" was originally used in the early Whole Farm Planning days to describe some of the larger and more complex farming operations (i.e., farms with multiple farmsteads or large cropland acres) because these farms often required significantly more staff hours to plan. This distinction was important for distributing the Whole Farm Planning workload equally among staff. However, now that most large farms have been planned, there is consensus within the WAP that tracking "sub-farms" is no longer necessary.

5.2 Farmer Acceptance, Implementation and Maintenance of Whole Farm Plans

Over the course of nearly two decades, the WAP has developed hundreds of Whole Farm Plans while supporting the implementation of thousands of BMPs. As the program transitions to more of an operation and maintenance phase, DEP supports criteria that emphasize the acceptance, implementation and maintenance of Whole Farm Plans. In general, these criteria rely heavily on qualitative data gathered during the Whole Farm Plan annual status review step. Among the routine questions asked of WAP participants include:

- "Are the water quality issues on your farm addressed by your Whole Farm Plan?"
- "Have you experienced challenges in carrying out any part of your Whole Farm Plan?"
- "Are all of your BMPs working effectively?"
- "Have you been able to meet BMP Operation and Maintenance requirements?"
- "Are there issues/comments about the Program, or your Whole Farm Plan, that you would like to discuss and/or have related to the WAC?"

In addition to conducting annual status reviews, the WAP has periodically conducted farmer surveys as part of its historical biennial evaluations. Below is a brief summary of key findings compiled through farmer surveys over the years:

- In 1997, surveys were mailed to all WAP participants with a 35% response rate. For most questions pertaining to farmer satisfaction, understanding and acceptance of Whole Farm Plans, respondents indicated a 75% positive ranking or higher. Only half the respondents answered questions regarding the degree of implementation, with several of the comments relating to a desire/expectation for faster rates of implementation.
- In 1999, the WAP randomly selected 10% of all participating farms to receive an in-depth interview by WAC Board members. A total of 24 interviews were conducted with 71% agreeing that their Whole Farm Plans adequately addressed the water quality issues

on their farms. The interviews also revealed that most farmers were satisfied with their BMP implementation (although some farmers felt that implementation rates needed to be faster) and more education is needed with regards to nutrient management plans.

- In 2002, the WAP randomly selected 25% of all participants to receive an in-depth interview by WAC Board members. A total of 75 interviews were conducted with most farmers expressing higher satisfaction with their BMPs as compared to previous years (especially structural BMPs), and fewer farmers complaining about the rate of BMP implementation. Some farmers expressed concern about the future maintenance and replacement of BMPs on their farms, and an overwhelming majority stated that the environmental conditions on their farms had improved over the last five years.
- In 2004, the WAP conducted interviews with 20 randomly selected farmers with "substantially implemented" Whole Farm Plans. The surveys revealed that 90% were following nutrient management plans, 70% were satisfied with their BMP implementation, 90% felt that the BMPs were holding up well, and 85% felt that the environmental conditions on their farms had improved as a result of their Whole Farm Plans. Structural BMPs were again reported by farmers as being the most beneficial.

DEP recommends that the WAP continue to monitor and report on farmer acceptance, implementation, and maintenance of Whole Farm Plans as measured during annual status reviews and periodic participant surveys. In fact, DEP recommends that the WAP place a higher priority on the annual status review process overall with the following proposed metric:

- Conduct annual status reviews on at least 90% of all active Whole Farm Plans (with a goal of achieving 100% if possible) and report on key findings annually.

In addition to emphasizing annual status reviews, DEP recommends that the new BMP Repair & Replacement Strategy be included as qualitative criteria in order to protect and maintain the substantial investment of City and federal funding in the watershed's agricultural infrastructure. The strategy, which was developed collaboratively by all of the WAP partners in 2008, describes a process for: (1) identifying and evaluating aging/failing BMPs that are still needed for water quality protection; (2) incorporating BMP repair or replacement into the existing Whole Farm Plan revision process; and (3) prioritizing BMPs for repair or replacement. This strategy will allow the WAP to address hundreds of structural BMPs that are beginning to exceed their lifespans, which is defined by the NRCS as the minimum time period in which BMPs are to be maintained and used for their intended purpose. Since many BMPs will continue to function beyond their minimum lifespan if they are properly installed and maintained, the BMP Repair & Replacement Strategy ensures through the annual status review process that farmers renew their operation and maintenance agreements for at least a year for expired BMPs that are still functioning. Towards this end, DEP recommends the following metrics:

- Implement the BMP Repair and Replacement Strategy and report annually on the number of renewed/extended BMP operation and maintenance agreements.
- Revise Whole Farm Plans based on a new prioritization strategy (TBD).

5.3 Reduction of Phosphorus and Parasite Loading Risks

One way to measure phosphorus and parasite loading risk is to analyze the number of animal units treated through the WAP. Table 8 documents that of the 18,320 total animal units

identified and/or estimated to exist on both large and small farms, about 81% of these animal units are addressed through a large farm Whole Farm Plan and about 9.5% are addressed through a small farm Whole Farm Plan. Thus, more than 90% of all animal units are already covered by Whole Farm Plans on both large and small farms. As the remaining large farms develop Whole Farm Plans, and additional small farms are planned every year, the percentage of animal units addressed through the WAP will likely approach (and possibly exceed) 95%.

Table 8. Total animal units (AU) on all West of Hudson Watershed farms.

Farm Category	AU	Percent
Large farms with Whole Farm Plans	15,035	80.9
Large farms without Whole Farm Plans (estimated)	355	1.9
Non-participating large farms (estimated)	591	3.2
Small farms with Whole Farm Plans	1,770	9.5
Small farms without Whole Farm Plans (Tier I & II)	832	4.5
Total	18,583	100.0

With respect to animal units on small farms specifically, DEP already described in its *2009 Small Farms Assessment FAD Report* why potential water quality impacts from small farms without Whole Farm Plans is believed to be relatively minor when compared to total animal units already treated. In summary, data compiled from 265 Tier I questionnaires indicates that 28% of all small farms have no animal units, 38% have animal units in the 1-10 range, 17% have animal units in the 11-20 range, and only 17% of all small farms have greater than 20 animal units. The fact that nearly two-thirds of all animal units identified on small farms are already covered by Whole Farm Plans is one of the reasons why DEP and WAC support lowering the annual small farm FAD planning goal from ten plans per year to a range of 6-10 plans per year (similar to the WAP East of Hudson FAD planning goal). Establishing a range would provide the WAP with some additional flexibility to target future Whole Farm Planning efforts on those farms (small or large) posing the highest risk to water quality.

In addition to quantifying animal units, it is also useful to consider manure application trends as an indicator of phosphorus and parasite loading risks. The WAP supports a Nutrient Management Credit (NMC) Program which encourages heightened stewardship of manure resources by 84 large farms (80 of which are in the Cannonsville Reservoir basin). Participants who document they are implementing their nutrient management plans (NMPs) can receive monetary credits towards their nutrient management expenses such as equipment purchases, repairs, and services. An analysis of manure application records from 2007-2008 showed that participants applied manure within guidelines on over 99% of their acreage.

With particular respect to phosphorus levels in the Cannonsville and Pepacton Reservoirs, DEP's last two *Watershed Protection Program Summary, Assessment and Long-Term Reports* (2001 and 2006) have demonstrated ongoing water quality improvements attributable to the WAP. In 2008, the median total phosphorus levels in all Catskill/Delaware reservoirs were at or near their lowest concentrations since 1997, with the Cannonsville Reservoir in particular remaining non-phosphorus restricted for several years in row. Below are some key excerpts from DEP's 2006 *Watershed Protection Program Summary, Assessment and Long-Term Report* (pp.358-378) regarding phosphorus (P) reductions due to the WAP:

- "Loads in runoff from agricultural land uses are reduced by 58.1% for Cannonsville due to the combination of land use changes and management programs. This agricultural source load reduction represents a 21.3% reduction of the total annual dissolved P load from the entire watershed. For Cannonsville, annual dissolved P in agricultural runoff was reduced by 35.7% simply due to less farming, including fewer farmed hectares and lower density of animal units in the watershed. An additional 34.8% reduction was achieved by adding the effects of agricultural BMPs. Compounding these two reductions produces the final 58.1% total reduction in annual loads from agricultural runoff."
- "For Pepacton, reductions in agricultural runoff loads due to land use changes and management programs were similar (56.4%) to Cannonsville. However, the influence of the agricultural reduction on the total annual P load (12.2%) was not as great because agricultural runoff is not as large in Pepacton."
- "Overall dissolved P reductions from both land use change and watershed management programs are considerable. Of the total 46.4% reduction due to land use change and management programs for Cannonsville, 21.3% comes from agricultural runoff, 15.2% from wastewater treatment plant improvements, 7.7% from reductions in loads during baseflow periods, and 2.2% from septic systems. For Pepacton, the total load reduction of 27.4% consists of a 12.2% reduction from agricultural runoff, a 2.5% reduction from septics, 8.5% from reductions in load during baseflow periods and a 4.2% reduction from wastewater treatment plants."
- "For Cannonsville, average annual particulate P loads for baseline conditions come mainly from agricultural runoff (91.9%). Therefore, any reductions in particulate P from agricultural sources will have a significant impact on total watershed reductions. In Pepacton, agricultural runoff (78.2%) and forest/grass-shrub (16.4%) are the dominant contributors to the particulate P load. Most of the particulate P load to both Cannonsville and Pepacton comes from agriculture. For agricultural runoff, annual particulate P was reduced by 34.2% in Cannonsville and 33% in Pepacton due to the reductions in farming, including fewer farmed hectares and lower animal density in the watershed. Effects of agricultural BMPs produced an additional 56.2% reduction in Cannonsville and 61.4% reduction in Pepacton. Compounding the reductions due to both land use changes and watershed management produces the final 65.4% total reduction in annual loads from agricultural runoff in Cannonsville and 74.1% total reduction from agricultural sources in Pepacton. Therefore, for agricultural runoff, roughly two-thirds of the expected particulate P reductions are due to watershed management programs, while the remainder is due to changes in the level of agricultural activity, independent of watershed management activities."
- "In the Cannonsville watershed, significant loading reductions are predicted due to the decline in agriculture that has occurred (independent of watershed management) from baseline to post-2000. These changes result in ~20% reduction in predicted total dissolved loads and ~30% reduction in total particulate loads to Cannonsville. When watershed management programs in Cannonsville are considered in addition to the land use changes, predicted load reductions are quite substantial, exceeding 46% for dissolved P and 68.5% for particulate P. For dissolved P, point source wastewater treatment plant upgrades and the implementation of agricultural BMPs by the WAP provide most of the loading reductions. Particulate P load reduction stem mostly from the WAP."

- "Estimated loading reductions for the Pepacton watershed due to land use changes and watershed management were less than for Cannonsville, but still substantial (27.4% for dissolved P, 58.2% for particulate P). The decline in farming activity over the last decade also produces large reductions in dissolved P loading. This land use change results in ~15% reduction in predicted total dissolved loads and ~25% reduction in total particulate loads to Pepacton Reservoir. For the watershed management programs, the implementation of agricultural BMPs by the WAP provides much of the loading reductions for both dissolved and particulate P."

Another major study conducted by the DEC (Bishop et al. 2006) also documented significant reductions in nutrient and sediment loads resulting from the WAP. In 1993, a paired watershed study was established on a participating Cannonsville dairy farm to monitor and evaluate water quality pre- and post- implementation of BMPs such as manure management, rotational grazing, and improved infrastructure. The results from this 13-year study demonstrated overall farm load reductions of 64% for total ammonia, 53% for total dissolved P, 36% for particulate P, 28% for total suspended sediment, and 23% for nitrite+nitrate. The study concluded that "implementation of BMPs on the monitored farm resulted in a large number of changes to many aspects of the farm's infrastructure and management, and the observed reductions in nutrients and sediment loads are probably attributable to all of them. The results of the study quantitatively demonstrate that dairy farm BMPs can be successful in reducing losses during runoff events as well as baseflow periods. Our findings provide evidence that the WAP has reduced phosphorus and ammonia loading to the…Cannonsville Reservoir."

In light of the above, DEP believes that the WAP has been successful at reducing phosphorus and parasite loading risk from farm to watercourse as per the current WAP evaluation criteria. In some respects, the WAP has achieved a certain degree of water quality protection and risk reduction over the years, based primarily on large farm participation but also on small farm assessments, that suggests significant future investments might yield incremental water quality results. Looking ahead to the future, DEP recommends that the WAP continue reducing agricultural pollutant risks by adopting a new BMP Prioritization Methodology that will target BMP implementation both within a farm and between farms in order to maximize water quality benefits based on the highest priority pollutant categories in a Whole Farm Plan.

5.4 Efficacy of Whole Farm Planning and the Implementation Process

Through the years, the WAP has undergone numerous modifications to improve the efficacy of the Whole Farm Planning and implementation processes. Some historic examples include the creation of a Nutrient Management Planning Team, Conservation Reserve Enhancement Program (CREP) Team, and Small Farms Team, not to mention the periodic reshuffling of planning teams based on workload or FAD goals. In response to the major flood of June 2006, for example, the WAP developed an Agricultural Flood Response Team that performed rapid phone assessments on 369 farms and field assessments on 253 farms while securing federal emergency funds to assist with repairing the damaged infrastructure. In 2008, the WAP also developed a BMP Repair and Replacement Strategy as well as a proposed BMP Prioritization Methodology to help guide future efforts.

During 2008-2009, WAC undertook a comprehensive decision-making consultancy project with the goal of improving the overall effectiveness of the organization and its various programs. With respect to the WAP, the decision-making consultants offered a series of recommendations for streamlining the Whole Farm Plan approval process which was deemed to be redundant and cumbersome. As a result of that effort, as well as the development of new prioritization methodologies, many of the WAP policies and guidelines are now being clarified and updated so that WAP staff better understand their programmatic responsibilities.

Looking ahead, one issue that may impact the efficacy of Whole Farm Planning and BMP implementation is the revision of Whole Farm Plans. In general, Whole Farm Plans can be revised based on changing conditions on the farm, enhanced planning tools, new water quality issues, or administrative reasons such as BMP cost changes, date changes, or new/deleted BMPs. On average, most Whole Farm Plans are revised at least three times, with some plans being revised upwards of 10-12 times during their lifespan. Most recently, many Whole Farm Plan revisions were prioritized based on the need to achieve the "substantially implemented" FAD metric which takes into account the scheduling of BMPs based on pollutant categories and other administrative reasons that are non-technical in nature. DEP and its WAP partners agree that future Whole Farm Plan revisions should be guided by a new prioritization strategy.

Another consideration that DEP believes will be important to the WAP's future is the degree to which its institutional capacity is upheld and strengthened. The vast infrastructure of agricultural BMPs implemented throughout the watershed needs to be matched with an equally competent and effective programmatic infrastructure that is responsive to BMP failures or emergencies (such as manure spills or leaks), flooding and other weather-related impacts, farmer concerns, and other issues. The institutional capacity of the WAP becomes increasingly important as the program shifts towards continued operation and maintenance of Whole Farm Plans and many BMPs reaching their lifespan need to be repaired or replaced.

5.5 Science of Whole Farm Planning

The science of Whole Farm Planning was firmly established during Phase I of the WAP (1992-1994), during which time a Cornell University Whole Farm Planning Scientific Support Group worked closely with WAC, DEP and the WAP partner agencies to create a three-part document called the *Watershed Agricultural Council's Approach to Whole Farm Planning*. Since then, many of the tools and technical aspects of the Whole Farm Planning process have been further developed and revised to reflect new scientific research. Although the focus of the WAP has shifted over the years away from active research towards an increased emphasis on Whole Farm Planning and BMP Implementation goals, the science of Whole Farm Planning continues to evolve through smaller-scale research and demonstration projects implemented as funding opportunities arise. Examples of some recent WAP-supported research projects include on-farm composting, bedded pack management systems, no-till crop production, and precision feed management. To date, more than 140 scientific papers relating to the WAP have been produced, an impressive volume by any measure (please refer to Appendix A).

During the past two decades, the WAP has also been involved with at least two other major scientific efforts relating to agricultural BMPs and Whole Farm Planning. One of these

studies – the paired watershed research project conducted by the DEC on a Cannonsville basin dairy farm – was already referenced in this report (Bishop et al. 2006) and is further summarized in a report compiled by the New York State Water Resources Institute titled, *Focus on a Farm: A Compendium of Scientific Work on a New York State Agricultural Watershed* (Porter et al. 2008). The second effort involved the Town Brook Research Group, which was a cooperative effort between DEP, USDA Agricultural Research Service, Cornell University, and the US Geological Survey that conducted numerous research projects between 1999 and 2006 in the Town Brook Watershed. The two main research objectives were to develop, implement and evaluate BMPs for minimizing phosphorus loss from farms and to apply and improve field-scale and farm-scale indices and models to support nutrient management planning throughout the watershed.

DEP believes that the science of Whole Farm Planning has been firmly established and therefore recommends that the WAP continue to monitor and track related scientific research as in previous years. When appropriate, the WAP should continue integrating new scientific research findings into the Whole Farm Planning and BMP implementation processes.

6. Discussion of the "Substantially Implemented" FAD Metric

One metric that has been used to measure the WAP's accomplishments during the past two FADs has been the "substantially implemented" definition for Whole Farm Plans. This metric was originally proposed by DEP and WAC in 1997 to better reflect a shifting emphasis away from planning and more towards implementation goals (as measured by "substantially completed" Whole Farm Plans). The new metric was accepted by the FAD regulators in 1998 and formally codified in both the 2002 and 2007 FAD as "substantially implemented" or SI.

According to the 2007 FAD, Whole Farm Plans are considered to be SI when seven of the nine highest priority pollutant categories have been addressed and the remaining two pollutant category BMPs are scheduled for implementation within the next two years. The 2007 FAD requires that 90% of all West of Hudson large farms maintain their SI status by September 30, 2010. This FAD goal was met on schedule and reported by DEP in September 2010.

It is important to note that for several years, the WAP has essentially prioritized BMP implementation to meet the 90% SI milestone. As documented in Figure 8, however, the WAP has fallen short of meeting its annual SI goal since at least 2002. One of the challenges has been the degree to which SI farms fall out of that status because new pollutant issues are discovered or previously implemented BMPs either fail or no longer meet new design standards. Another reason is that farmers are sometimes reluctant to proceed with a BMP project, or else they change or expand their farm enterprise, which prevents a Whole Farm Plan from becoming SI.

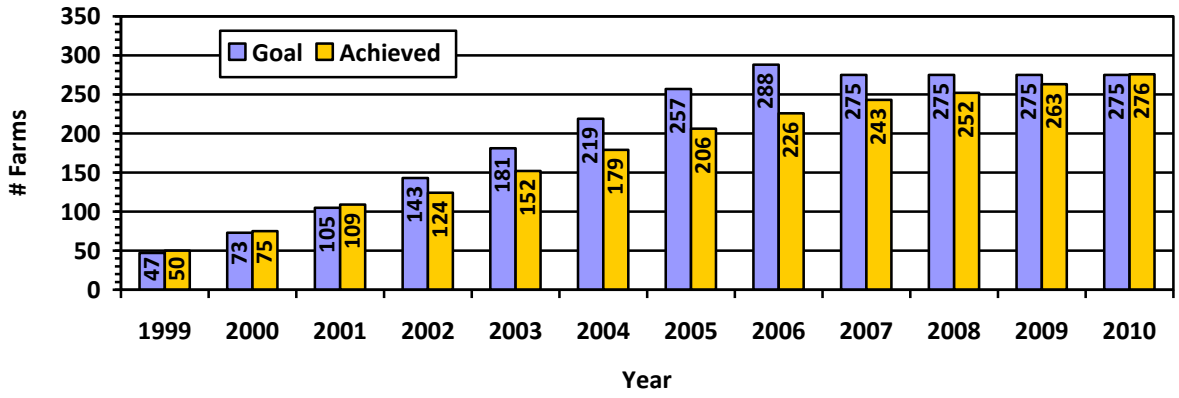

Figure 8. Annual progress of the WAP towards meeting the "substantially implemented" FAD metric (1999-2010).

In summary, although the SI metric was designed to ensure Whole Farm Plans are implemented in a timely manner, it does not take into account the reality of WAP staff workload, regional contractor capacity, or the vast array of changes that occur on watershed farms on an ongoing basis that may require new BMPs or revisions to Whole Farm Plans. For these reasons, as reported in previous FAD reports, it is more important for as many farms to become SI at least once as opposed to maintaining that status on every farm at all times. Once 90% of large farms achieve SI at least once, this ensures a minimum level of treatment from which the WAP can begin to prioritize BMP implementation.

The 2007 FAD states that the SI metric has the potential to be revisited and revised as the WAP matures and additional information becomes available. Now that 90% of all large farms have become SI at least once, DEP and its WAP partners strongly believe that the WAP has reached a point of maturity where the SI metric no longer applies and that beginning in 2011 the WAP should adopt and implement a new BMP Prioritization Methodology.

6.1 Proposed New BMP Prioritization Methodology

Setting priorities for BMP implementation between farms and within Whole Farm Plans has been a desired goal since the WAP's inception. Historically, the WAP has been able to implement approximately $2.5 million worth of BMPs annually, with more than $34 million being spent on more than 5,000 BMPs on both large and small farms during the cumulative period 1993-2009. Nevertheless, there remains a backlog of BMPs that exceed the WAP's capacity to implement them on an annual basis. This backlog includes approximately 682 BMPs that already have funding approved (~$7.1 million) and approximately 293 BMPs that are categorized as new and unfunded (~$4.9 million). These figures tend to change whenever a new Whole Farm Plan is developed, an existing Whole Farm Plan is revised, or existing BMPs need to be repaired or replaced.

Early in the WAP's history, the Environmental Review/Problem Diagnosis (ER/PD) tool was developed to identify water quality concerns on large farms and provide a framework for

prioritizing Whole Farm Plan development. This tool continues to be used when assessing large farms. Since around 2000, the NYS Agricultural Environmental Management (AEM) worksheets have been used by the WAP to document environmental issues and prioritize Whole Farm Plan development on small farms. Whether the ER/PD or AEM worksheets are utilized, all of the pollutant issues and recommended BMPs are listed in one of the eleven pollutant categories on each Whole Farm Plan's BMP Implementation Schedule (WFP-2).

In general, pollutant categories I, II and III address storage concerns for manure, pesticides, and fertilizers (places where catastrophic failure can cause major water quality impairment); category IV addresses the potential for pathogen shedding from livestock and young stock; category V addresses land application of manure and nutrients; category VI addresses accumulation and runoff of milk house waste, silage leachate, and manure from barnyards and other livestock areas; category VII addresses soil erosion from cropland; category VIII also addresses erosion and specifically where sediment is delivered to a hydrologically sensitive area (i.e., cattle access areas); category IX addresses field application of pesticides; category X addresses farm fuel tank placement and containment; and category XI addresses all other issues not previously covered by the other pollutant categories.

The proposed new BMP Prioritization Methodology relies on a risk-based framework for ranking farms and scheduling BMPs annually. The methodology incorporates weighted criteria representing nutrient and pathogen indicators (animal units/density, soil phosphorus saturation, and type/number of young stock), as well as field distance to watercourse and proximity of livestock housing to watercourses, to rank farms based on water quality risk. All BMPs associated with riparian buffers (including CREP) are ranked as the highest priority, with remaining BMPs ranked based on highest to lowest pollutants categories.

Every year, a Project Planning Group consisting of WAC, DEP and other senior WAP staff will review all ranked BMPs and make implementation recommendations to the WAC Agricultural Committee based on three primary Implementations Areas: (1) CREP & riparian buffer BMPs; (2) Approved large and small farm BMPs; and (3) BMP repairs and/or replacements. Annual BMP implementation recommendations will take into account on-the-ground factors such as farmer readiness and potential grouping of BMPs to achieve efficiencies. One comment received from the WAC Advisory Committee suggested that prioritization also take into account basin-specific water quality concerns associated with individual reservoirs, so this potential criterion will be explored during 2011 as the new methodology is tested.

As presented to the WAC Advisory Committee in October, now that the WAP has achieved its 90% SI goal, there is consensus among all the WAP partners to begin implementing the new BMP Prioritization Methodology in 2011. Towards this end, the WAP Project Planning Group has recommended the following budget amounts for the three primary Implementation Areas: $557,661 for CREP and riparian buffer BMPs; $1,792,339 for approved large and small farm BMPs; and $150,000 for BMP repair and replacement. These three budget amounts equate to a $2.5 million total BMP budget for 2011, for which the WAP has identified $5.3 million worth of potential BMP projects. As with any programmatic transition, 2011 will be a year in which the WAP works through its new BMP Prioritization Methodology and continues to evaluate its efficacy and make adjustment as needed.

7. Summary of Recommendations

Since 1992, the WAP has produced significant accomplishments with respect to securing voluntary participation and support for an effective and scientific Whole Farm Planning and BMP Implementation program that reduces the pollutant loading risk from farm to watercourse. Based on a year-long evaluation that included input from the WAC Advisory Committee, DEP and its WAP partners believe that the current WAP evaluation criteria remain useful for assessing the full range of program activity with some proposed modifications and refinements for the future. Summarized below are the key WAP evaluation findings and recommendations:

1. The traditional universe of large commercial farms in the Catskill/Delaware Watersheds has declined dramatically since the inception of the WAP, with the regional dairy industry continuing to experience significant economic challenges. These local trends reflect broader regional conditions affecting the agriculture sector. As the WAP transitions away from working with large commercial farms towards smaller farms with fewer animals and potentially fewer water quality issues, the WAP will need to balance future water quality investments against potentially incremental improvements.

2. WAP Evaluation Criteria #1 (Farmer Participation) remains a valid and meaningful measure of success and should continue to be utilized in the future with the proposed elimination of the "sub-farm" designation and a continued emphasis on increasing farmer participation in other watershed programs and opportunities. With respect to small farms, DEP and its WAP partners recommend lowering the current FAD planning goal from ten plans per year to a more flexible range of 6-10 plans per year.

3. WAP Evaluation Criteria #2 (Farmer Acceptance, Implementation and Maintenance of Whole Farm Plans) remains a valid and meaningful measure of success and should continue to be utilized in the future with a continued focus on the annual status review process and a new prioritization methodology for Whole Farm Plan revisions.

4. WAP Evaluation Criteria #3 (Reduction of Phosphorus and Parasite Loading Risks) remains an important measure of success that has been well documented over the years through various water quality monitoring and modeling efforts. After aggressively pursuing numeric planning and implementation goals for nearly two decades, the WAP should be acknowledged for achieving a cumulative reduction of risk with respect to the current known universe of farms with the understanding that future water quality improvements may be incremental given regional agricultural trends.

5. WAP Evaluation Criteria #4 (Efficacy of Whole Farm Planning and the Implementation Process) remains a useful measure of success despite a general completion of initial large farm planning and a transitional focus to small farm planning, large farm annual status reviews and plan revisions, and the continued implementation of BMPs on both small and large farms. Future Whole Farm Plan revisions should be prioritized and monitored to avoid creating a BMP backlog. The institutional capacity of the WAP should continue to be viewed favorably as an important measure of program success.

6. WAP Evaluation Criteria #5 (Science of Whole Farm Planning) also remains a useful measure of success and the WAP should continue to monitor and track related scientific research while integrating new scientific research findings into the Whole Farm Planning and BMP implementation process when appropriate.

7. The current 2007 FAD metric regarding "substantially implemented" Whole Farm Plans should be revisited and replaced with a new BMP Prioritization Methodology beginning in 2011. Other potential metrics for quantitatively evaluating the success of the WAP moving forward are suggested throughout this report. These proposed new metrics were developed collaboratively by all of the WAP partners and reviewed/endorsed by the full WAC Advisory Committee pursuant to the requirements of the 2007 FAD.

APPENDIX A
Bibliography of WAP-Related Scientific Research Publications

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