Alexander B. Grannis
Commissioner

Chesapeake Bay Nitrogen, Phosphorus and Sediment Total Maximum Daily Loads

New York Draft Phase I Watershed Implementation Plan

Table of Contents

Introduction

A. Background

Faced with water quality and living resource impairments, a Chesapeake Bay Program (CBP) was established in 1983 to protect and restore this important natural resource. Its original members were the states of Maryland, Virginia, and Pennsylvania, the United States Environmental Protection Agency, the Chesapeake Bay Commission (represents state legislature of MD, VA, and PA) and the District of Columbia. In 2000, the CBP sought New York's participation in its longstanding effort to restore Chesapeake Bay. As a part of its ongoing state-wide water quality program, New York has made significant accomplishments. Chief among these were the actions of the Binghamton –Johnson City Joint Sewer Board to conduct a comprehensive upgrade of its wastewater treatment plant[1], including nutrient removal and combined sewer overflow abatement, and New York State's development in 2006 and continuing implementation of a Tributary Strategy for Chesapeake Bay Restoration[2] (Strategy.) New York participated as a good neighbor, though there were no water quality standard-based needs within New York for a heightened program.

New York's Strategy was developed from 2004-2006 through a coordinated effort of federal, state and local agencies and interested parties. The extensive public input and participation produced a strategy that describes a practical approach to nutrient and sediment reduction provided that there were very high levels of funding, staffing and time necessary for implementation. It forms the basis of this draft Phase I Watershed Implementation Plan. The New York State Department of Environmental Conservation (DEC), in partnership with the New York State Department of Agriculture and Markets, is in the midst of implementing components of this Strategy, including the nutrient removal optimization and engineering assessment requirements of Bay-significant wastewater treatment plants.

These actions, combined with the ongoing delivery of New York's complement of Clean Water and Clean Air act regulatory programs (which in many instances greatly exceed federal minimum requirements), a decrease in human population, and an increase of forested land are reflected in the most recent watershed modeling conducted by the United States Environmental Protection Agency Region 3[3]. This modeling shows, comparing 2002 to 2007, that the nitrogen load delivered from New York decreased by 8%[4]. Similarly over the same time period, phosphorus decreased by 12%[5]. Of particular note is that the model shows that nitrogen from agriculture reduced by 27% over this period[6]. Unlike a number of down-basin areas, New York's portion of the Chesapeake Bay watershed is characterized by very low growth, low intensity agriculture, forest, low income and high water quality.

New York is encouraged by the reduction in nutrient loads and the observed positive effects on living resources in the Upper Chesapeake Bay. For instance, in 2009, submerged aquatic grasses in the Upper Bay covered about 23,598 acres, nearly 100 percent of the area's 23,630-acre goal[7].

[1] The Binghamton-Johnson City facility is the largest Bay-significant facility in New York, accounting for about a quarter of the total WWTP flow, and because of its down basin location, about a third of the total WWTP nutrient load
[2] http://www.dec.ny.gov/docs/water_pdf/cbaystratfinal.pdf
[3] Watershed Model phase 5.3 dated 7/30/2010
[4] from 13,406,658 pounds in 2002 to 12,306,466 pounds in 2009
[5] from 975,163 pounds in 2002 to 855,255 pounds in 2009
[6] From 5,917,424 pounds in 2002 to 4,293,439 pounds in 2009
[7] 2009 USEPA R3 Bay Barometer report

B. Chesapeake Bay Total Maximum Daily Load Draft Allocations

On July 1, 2010, USEPA R3 assigned draft nitrogen and phosphorus load allocations to New York. On August 13, 2010, USEPA R3 assigned a draft sediment allocation to New York. USEPA R3 believes that such state-level draft allocations will achieve the water quality standards of Maryland, Virginia and the District of Columbia for the 92 water body segments included in its nutrient and sediment Total Maximum Daily Load being developed for the Chesapeake Bay and its tidal tributaries. The submission of this draft Phase I Watershed Implementation Plan should not be interpreted as New York's acceptance of these draft allocations and other program elements. New York has repeatedly expressed serious concerns over the fundamental fairness of these allocations and intends to again present these concerns during the upcoming public comment period.

Table 1. USEPA R3's Draft Allocations to New York

	Allocation (Delivered Load)	Reserve
Nitrogen	8.23	0.41
Phosphorus	0.52	0.03
Sediment	293-322 range[8]	

Units are million pounds per year. 5% reserve pending completion of EPA Phase 5.3 watershed model in 2011.

Because USEPA R3 has indicated that the achievement of the phosphorus and nitrogen allocations would resolve sediment related water quality impairments (i.e., clarity), except for some water body segments of tidal tributary waters not directly affected by the Susquehanna River flows, it is unclear why USEPA R3 expects to include New York in the sediment portion of the Bay TMDL. There would appear to be no legal, factual or scientific reason to do so. As such, this draft Phase I WIP does not specifically describe source category sediment allocations. Yet, many of the actions described herein related to sediment as well as nutrients.

Another consideration is that while USEPA R3 has allocated draft loads to the jurisdictions and to federal air quality programs to effect reductions in such pollutants from being delivered to the Bay, USEPA R3 has not similarly allocated loads or completed assessments of other opportunities to effect reductions in pollutants that stem from activities within the Bay. Such activities include:

- over board discharges of wastewater[9]
- navigational dredging
- beneficial filter feeding aquatic organisms[10]

C. Allocation Principles

Growth

According to an analysis conducted by USEPA R3 of calendar year 1985 versus 2010 "no action" scenarios, baseline pollutant loadings from New York have substantially declined since 1985 (2.44 million pounds per year less for nitrogen and 0.08 mpy less for phosphorus.) This smaller baseline footprint is largely a result of actions taken to effectively deliver regulatory and voluntary State and

[8] USEPA R3 watershed model results for 2009 shows 327 mpy of sediment delivered from New York. All model scenarios submitted by New York show that future sediment loads are expected to be 277 to 329.
[9] New York established an extensive "no discharge zone" for Long Island Sound, which is similarly impaired.
[10] DEC also understands that USEPA is investigating opportunities to incorporate bio-extraction in its water quality improvement plans related to nutrient enrichment in Long Island Sound.

Federal agricultural programs as well as other Clean Water and Clean Air Act related programs, a decline in population and increase of forested land in New York. In contrast, the USEPA R3 analysis shows that some other states have dramatically increased baseline pollutant loads since 1985, increases that in some cases exceed by multiple factors the total delivered nutrient load from New York. By way of example, every four years the human population of other portions of the Chesapeake Bay watershed has increased in an amount equal to the entirety of New York's population within the watershed. The draft allocations do not take into consideration this important principle regarding an accounting of the growth in states' baseline pollutant loadings since knowledge of Bay water quality and living resource impairments was widespread since the early 1980s.

Credit for Past Reductions

In formulating the load allocations to states, USEPA R3 has made clear that all previous reductions in nutrient loads are credited toward achieving final cap loads. Yet, the baseline reduction in New York (minus 2.44 mpy nitrogen and 0.08 mpy phosphorus since 1985) is not reflected in the draft allocations. Conversely, the USEPA R3 allocation process has had the effect of granting larger state-level allocations to states that have substantially grown baseline loads since 1985. For example: New York makes up about 10% of the total Bay watershed and receives less than 5% of the total nitrogen allocation to the states. Whereas, Maryland, which makes up about 14% of the total Bay watershed, receives more than 20% of the available nitrogen allocation.

Impact to the Bay

DEC appreciates USEPA R3's efforts to allocate the highest reductions of nutrients from tributary basins with the highest impact on Chesapeake Bay tidal water quality, and the large volume of the Susquehanna River flow. DEC also understands that USEPA R3's assessment of the Susquehanna impact is based on its modeling, improved with the availability of non-tidal stream monitoring data. Conversely, DEC understands that the same level of input monitoring is not available for many tidal areas of the coastal plain, which contain concentrated development and agriculture. Absent monitoring, model assumptions may underestimate the impact of the coastal plain loads and their impact on bay water quality, especially on the vast areas of shallower water that are most susceptible to impacts. This situation has likely resulted in an over estimate of Susquehanna River impacts.

Everything, Everywhere by Everyone

USEPA R3's draft allocations and allocation formulations reflect an expectation for states to achieve a certain level of "everything, everywhere by everyone (E3)." This uniform definition of E3 does fully not take into account important differences across the large Chesapeake Bay watershed, such as climate and density of agriculture. For example, colder temperatures of the Allegheny Plateau region make cover cropping (shorter growing season), tillage practices (delayed spring soil warm up) and biological wastewater treatment less effective. Moreover, the low density of agriculture provides sufficient land base for produced manure, such that New York does not need the high degree of manure transport/export management as may be the case in other parts of the watershed. Accordingly, while it may appear USEPA R3 is seeking a smaller percentage of achieving E3 from New York, the fact is that that E3 is less attainable in New York. New York's water is also of high quality, and it is more difficult to get significant pollutant reductions from clean, as opposed to polluted water.

Water Quality Status

New York contributes low levels of nutrients to the Bay. A recent United States Geologic Survey report shows long term mean concentrations of 1.135 mg/l for nitrogen and 0.076 mg/l for phosphorus

at the nearest long term monitoring station to New York at Towanda, Pennsylvania[11]. New York estimates that if the water quality in the Bay were as good as the quality of water leaving New York, then the Bay would not be impaired[12]. The report also shows statistically significant declining trends for nitrogen and sediment and a slightly downward but statistically insignificant trend for phosphorus. Recently enacted legislation in New York reducing phosphorus in dishwashing detergent and lawn fertilizers will help reduce sources of phosphorus that may reach surface water.

Table 2. Chesapeake Bay Nutrient Allocation History

	Nitrogen			Phosphorus		
	Bay Total	New York allocation	New York % of total	Bay Total	New York allocation	New York % of total
2003[13]	183	12.58	6.9%	12.8	0.59	4.6%
2009[14]	200	10.54	5.3%	15	0.56	3.7%
2010[15]	203	8.23	4.1%	12.52	0.52	4.2%
2010 [16]	203	7.82	3.9%	12.52	0.49	3.9%

Nutrient values are million pounds per year

The draft nutrient allocations suggest that USEPA R3 expects New York to shoulder a disproportionate amount of reduction to help account for past down basin growth. Such growth has occurred since knowledge of the Bay's impairment and the additional pollutant load added by such growth was widespread. New York has previously informed USEPA R3 that its distribution of the draft state-level allocations has not taken into account such expected principles.

D. Sub-Allocation to Sources in New York

This Draft Phase I Watershed Implementation Plan aims to subdivide the draft nutrient load allocations among major source categories in New York. Because USEPA R3 has indicated that achievement of the phosphorus and nitrogen allocations would resolve sediment related water quality impairments (i.e., clarity), except for water body segments of tidal tributary waters not directly affected by the Susquehanna River flows, it is unclear why USEPA R3 expects to include New York in the sediment portion of the Bay TMDL. In fact, New York is unaware of any Bay water segment that is impaired due to sediment and affected by flows from New York – seemingly removing the basis for including New York in the sediment TMDL at all. Nonetheless, the nutrient reduction program described herein is based upon aggressive but practical and realistic levels of implementation activity and programs in New York. This draft will assist USEPA R3 as it finalizes its Chesapeake Bay TMDL.

[11] United States Geologic Survey Open File Report 2007-1372, "Changes in Streamflow, Concentrations, and Loads in Selected Nontidal Basins in the Chesapeake Bay Watershed, 1985-2006."
[12] USGS report 2007-1372 indicates that river flow to bay in 2006 was 18.5 trillion gallons, an average year. To meet 175 million pounds Total Nitrogen loading to Bay, a TN concentration of (175/8.34/18,500,000), or 1.13 mg/l and similarly a TP concentration (12.58/8.34/18,500,000), or 0.082 mg/l would be needed.
[13] Basis of states Tributary Strategies
[14] 2009 target allocations provided to states by EPA R3 on November 3, 2009 (does not include air)
[15] Revised target allocations provided to states by EPA R3 on July 1, 2010
[16] 2010 draft TMDL allocations, including reserve, provided to states by EPAR3 on July 1, 2010

Susquehanna/Chemung Watershed Program Implementation

New York will aggressively pursue implementation of its Final Phase I and subsequent Phase II WIPs. Substantial outside assistance should be forthcoming. The financial responsibility of New York's continued efforts must be at least partially shouldered by the federal government because:

1. Current low concentrations of nutrient and sediment in New York's Susquehanna waters;
2. Paucity of severe nutrient or sediment related water quality impairments, as listed in 303(d) reports approved by USEPA Region 2 (http://www.dec.New York.gov/chemical/31290.html);
3. Decline of baseline pollutant loadings since 1985 when Chesapeake Bay impairments were well known;
4. Lack of economic benefit received from Chesapeake Bay (well over $750 million/year to local economies - USEPA Region 3 estimates);
5. Financial constraints of low income New York part of the watershed;
6. Inability to control atmospheric nitrogen received from sources beyond New York (especially important because the New York portion of the Bay watershed has over 75% forested land cover)

In addition, USEPA R3 may also consider that the recent funding opportunity afforded through the Chesapeake Initiative in the 2007 Food and Security Act (Farm Bill) is well oversubscribed in New York. USDA/NRCS indicates that only 16% of eligible applicants were awarded conservation practice funding in 2009. Thus, a large number of landowners are prepared to implement additional conservation practices.

While it is fashionable to generally pronounce the Bay Program to be a failure, with the resultant need for added or heightened regulations and levels of effort to restore Chesapeake Bay, this is not the case in New York.[17] Understanding New York's small footprint on the Bay's water quality, the USEPA Chesapeake Bay Program only sought New York's participation in restoration efforts in 2000. Since then, New York has consistently reduced its controllable (non-forest) nutrient and sediment loads. Further, New York has neither been unaccountable for implementation efforts described in its current Tributary Strategy nor for its expenditures under the State Implementation Grant it received from the USEPA Chesapeake Bay Program. It is worth noting that of the roughly $20-$50 million annually appropriated to the USEPA Chesapeake Bay Program Office under Clean Water Act Section 117, beginning in 2004 New York received $250,000/year (just now increased to $500,000/yr.)

The facts and outcomes described above should reasonably assure USEPA R3 that both its existing New York Clean Water and Clean Air Act regulatory programs and its voluntary incentive based partner efforts are, and will remain, sufficiently protective. As further described herein, New York's regulatory program for concentrated animal feeding operations, municipal separate storm sewer systems, construction stormwater and air emission controls already surpass federal requirements. Within the context of this TMDL, a central tenet of the regulatory approach in New York is to first enhance the effective delivery of its existing science-based programs, as opposed to immediately rushing to promulgate new or heightened regulations specific to the Chesapeake Bay watershed. The pending Chesapeake Bay Regulatory and Accountability state grant to New York will support enhanced delivery of the regulatory programs while also evaluating appropriate refinements.

[17] New York was not the subject of recent Government Accountability Office and USEPA Inspector General reports critical of Bay restoration progress and states' accountability for past commitments.

E. Plan Revisions

Due to past and potential future revisions of the draft nutrient and sediment load allocations and the short time frame to prepare this Draft Phase I WIP, the Final Phase I WIP and subsequent Phase II WIP are expected to contain additional detail and refinement. New York expects substantial public comment prior to USEPA R3 issuing a final Chesapeake Bay TMDL, planned for December 2010.

USEPA has indicated[18] that States may revise their Final Phase I WIP based on revisions to the watershed model to address nutrient management effectiveness and suburban land characteristics. The USEPA R3 schedule to incorporate such revisions coincides with the November 2011 date to complete Phase II Watershed Implementation Plans. As such, it is not practical to establish specific nutrient reduction expectations, such as Waste Load Allocations for individual discharges within this Draft Phase I WIP.

F. Plan Format

The format of this Draft Phase I Implementation Plan follows the latest guidance issued by USEPA R3 on April 2, 2010. This guidance entails 8 required elements:

- Interim and Final Target Loads
- Current Loading Baseline and Program Capacity
- Accounting for Growth
- Gap Analysis
- Commitment and Strategy to Fill Gaps
- Tracking and Reporting Protocols
- Contingencies for Slow or Incomplete Implementation
- Appendix with Detailed Targets and Schedule

The sources of nutrient and sediment are organized in the following categories:

- Agriculture
- Urban Runoff
- Point Sources
- Septic Systems
- Forest
- Atmospheric Deposition

[18] June 11, 2010 "TMDL Schedule" letter from USEPA R3 to the States

I. Interim and Target Loads

USEPA R3 expects states to implement the actions necessary to achieve the draft nutrient and sediment allocations by 2025 and to have controls in place by 2017 that will achieve 60% of the necessary reductions from 2009 loads. More detail is provided for the larger sources in New York.

Table 3. Chesapeake Bay TMDL Nutrient and Sediment Delivered Load Allocations and USEPA R3 Expected Reduction Schedule

	Nitrogen	Phosphorus	Sediment
2009	10.54	0.80	327
2017 60% reduction goal	9.16	0.63	306 – 324 (range)
2025 TMDL allocation	8.23	0.52	293 – 322 (range)
2025 TMDL allocation w/ reserve	7.82	0.49	No reserve
Bay Total	203.14	12.52	6,066 - 6,673 (range)

Values are million pounds per year. All 2009 values are delivered load and an output of USEPA Chesapeake Bay Watershed Model Version 5.3.

The USEPA watershed model provides a description of the loads delivered to Chesapeake Bay from New York from major source categories. When comparing categories, it is important to note its 2009 point source wastewater load is based on the actual quantity discharged from wastewater treatment plants in the year, whereas the remaining non-point source loads are based on an average hydrologic year.

Table 4. 2009 Nutrient and Sediment Contribution from Major Source Categories

	Nitrogen	Phosphorus	Sediment
Agriculture	4,109,874 (39%)	346,992 (43%)	155,222,452 (47%)
Urban Runoff	597,147 (6%)	73,311 (9%)	53,920,725 (16%)
Point Source (wastewater)	1,648,004 (16%)	202,902 (25%)	2,374,683 (1%)
Septic	539,254 (5%)	0	0
Forest	3,647,206 (35%)	178,074 (22%)	115,636,379 (35%)
New York Totals	10,541,483	801,278	327,154,238

Values are pounds per year. In parentheses is the per cent of the total. Because both are largely uncontrollable load, the Forest category includes 107,438 pounds per year of nitrogen and 8,012 pounds per year of phosphorus attributed to Non-tidal Water Deposition. All 2009 values are delivered load and an output of USEPA Chesapeake Bay Watershed Model Version 5.3.

In 2006, New York developed a Tributary Strategy for Chesapeake Bay Restoration (Strategy) with extensive stakeholder input, particularly in the agricultural sector through its partnership with the Upper Susquehanna Coalition (USC). The USC is a bi-state coalition that includes 16 New York Soil

and Water Conservation Districts in the Susquehanna River basin. The DEC, in consultation with the USC, considered several factors to achieve an appropriate and reasonable balance among the source categories:

- Magnitude and certainty of nutrient sources
- Efficiency and sustainability of management practices
- Management practice cost effectiveness among and within source categories
- Voluntary implementation supported by funding
- Equity and fairness between categories associated with reasonable responsibility for nutrient sources
- Resulting local water quality or natural resource benefits

The Strategy describes a vision for implementation of nutrient reductions without specific regard to available funding, time constraints or staff. Implementation levels were determined by practitioners assessing levels of conservation practices required by CAFO permits, the likelihood of other landowners/producers to adopt various conservation practices with cost share funding, and other locally-specific factors. Agricultural practices and wastewater treatment upgrades are the highest overall priority for implementation.

The New York Chesapeake Bay TMDL Draft Phase I WIP continues with a similar approach used to sub-allocate loads among the major sources as was used to develop the Tributary Strategy. Factors involved include the magnitude of contributing source, the technical, administrative and fiscal capabilities of each major source category, and cost-effectiveness.

This Draft Phase I WIP refines the activities described in the Strategy. Subsequent plans will segregate expected reductions and major actions into 2-yr increments, in line with New York's initial 2009-2011 2-yr. milestone actions. Although the activities described in this Draft Phase I WIP are comparable to the Strategy, changes in the USEPA R3 Chesapeake Bay Watershed model make comparison of the delivered load outputs inappropriate.

Importantly, this Draft Phase I WIP includes pollutant reduction activities that are neither reflected in, nor fully accounted for, in the current Chesapeake Bay Watershed model (version 5.3.) As such, New York will continue to work with USEPA Region 3 to amend and improve its model and inputs so that it can more accurately portray actual conditions and practices in New York.

Table 5. Major Source Category Nutrient Targets[19].

		Nitrogen Delivered			Phosphorus Delivered		
		2009	**2017**	**2025**	**2009**	**2017**	**2025**
Agriculture	Total	4.11	3.62	3.30	0.35	0.30	0.26
	CAFO	de minimus	de minimus	de minimus	de minimus	de minimus	de minimus
Urban Runoff	Total	0.60	0.55	0.51	0.07	0.06	0.06
	Non-regulated	0.37	0.34	0.32	0.04	0.04	0.04
	MS4	0.23	0.21	0.19	0.03	0.02	0.02
	Const. SW[20]	0.004	0.004	0.004	0.001	0.001	0.001
	Indust. SW	de minimus	de minimus	de minimus	de minimus	de minimus	de minimus
Point Sources (wastewater)	Total[21]	1.65	1.53	1.53	0.20	0.11	0.10
	Bay-Significant		1.43	1.43		0.09	0.09
	Other (nonsigs)		0.1	0.1		0.01	0.01
	CSO	0.12	0.02	0.02	0.011	0.002	0.002
Septic		0.54	0.55	0.56	0.00	0.00	0.00
Forest[22]		3.65	3.71	3.76	0.18	0.18	0.18
Watershed Model Total		10.54	9.96	9.66	0.80	0.65	0.60
2017 60% target			9.16			0.63	
2025 target[23]				8.23			0.52
Modeled Difference			(0.80)	(1.43)		(0.02)	(0.08)

Gap Closers[24]		**Additional Expected Reductions**			**Additional Expected Reductions**		
	Atmospheric Nitrogen[25]		0.05 - 0.1	0.1 - 0.2			
	Other Model Improvement[26]		0.09 - 0.18	0.17 – 0.34		0.02	0.02
	Executive Order 13508[27]		0.25 - 0.40	0.45 - 0.50		0.02 – 0.04	0.05 – 0.08
	New technology /programs[28]			0.10 - 0.20			0.01 - 0.02
	Practices/programs not accounted for in Watershed Model[29]		0.06 - 0.12	0.12 - 0.25			0.01 – 0.02
Totals			0.45 - 0.80	0.95 -1.49		0.04 -0.06	0.09 – 0.14

[19] All target values are subject to verification in future model runs before TMDL is finalized. All values are million pounds per year. All values are delivered load and an output of USEPA Chesapeake Bay Watershed Model Version 5.3.

[20] Construction not in MS4 area

[21] Note that 2009 model results use actual WWTP discharge flows in 2009, whereas an average hydrology year is used for nonpoint source values. Because 2009 was a relatively dry year, WWTP may need adjustment.

[22] Because both are largely uncontrollable load, the Forest values include New York non-tidal water deposition.

[23] Targets with reserve are 7.79 mpy nitrogen and 0.49 mpy phosphorus

[24] A range is provided to account for the uncertainty in estimates of expected reductions

[25] As later explained in detail, among other things, New York estimates that USEPA has significantly underestimated the nitrogen reduction from scheduled future air program developments.

[26] Refer to Program Descriptions and Gap Analysis for details. Model improvements for New York conditions include, pasture management, nutrient management, alfalfa, and CAFO manure setback, comprehensive nature of MS4 program.

[27] Refer to Program Descriptions and Gap Analysis for details. Executive Order 13508 include basin riparian/aquatic habitat, wetland, and forest protection objectives that will contribute to nutrient and sediment reduction

[28] Refer to Program Descriptions and Gap Analysis for details. Includes road system BMPs and wastewater nitrogen optimization improvements

[29] Refer to Program Descriptions, Gap Analysis for details. Items not in model include floodplain management, ecosystem-based watershed planning, and Marcellus Shale development

II. Current Loading Baseline and Program Capacity

New York expects to aggressively pursue a balanced approach to implement additional conservation practices and controls and program enhancements to provide further reductions to New York's contribution to the Bay.

The New York State Department of Environmental Conservation is the agency in New York responsible for point source permit development and issuance and compliance assurance, including for surface and subsurface discharges of wastewater, construction stormwater, industrial (multi-sector) stormwater, concentrated animal feeding operations and municipal separate storm sewer systems. In addition to provisions of New York State Environmental Conservation Law and the DEC implementing regulations, the DEC Division of Water Technical and Operation Guidance Series (http://www.dec.New York.gov/regulations/2652.html) includes staff direction regarding water quality standards, permit administration, permit development, surveillance and compliance (including penalty assessments.)

The DEC Performance Partnership Agreement with USEPA Region 2 provides a detailed work-planned description of these staff-level efforts. These efforts will be enhanced by the pending Chesapeake Bay Regulatory and Accountability Grant.

For additional reference, attached are the General Permits and associated technical guidance. They are an integral part of this plan. They are also readily available at the DEC web site.

General Permits
Construction
Multi-Sector
MS4
CAFO(s)
Designation Criteria

Division of Water Guidance
Enforcement TOGS
Stormwater Inspection Manual
Stormwater Management Guidance for Local Officials
Pollution Prevention and Good Housekeeping Guidance

Technical Standards
NYS Standards and Specification for Erosion and Sediment Control
NYS Stormwater Management Design Manual
NRCS Standards for New York and New York CAFO Technical Standards

For ease of public understanding, subsequent program descriptions will fall under major source category headings whether or not a point source permit is required. These categories include:

A. Agriculture
B. Urban Runoff
C. Point Sources (wastewater)
D. Septic Systems
E. Forest
F. Atmospheric Deposition (not limited to water deposition)
G. Other

A. Agriculture

There are two primary and intertwined programs in New York that address agriculture: the New York Concentrated Animal Feeding Operation (CAFO) regulatory program and the New York Agricultural Environmental Management Program. It is important to note that the New York CAFO program covers all farms with as few as 200 cows with binding permits, whereas under the USEPA program, only some farms with greater than 700 animals would be covered by regulatory permits. 65 CAFOs are permitted in New York Chesapeake Watershed. New York's AEM program is currently working with 2,285 additional farms in the New York Chesapeake Bay watershed. New York's CAFO and AEM programs cover 95% of the dairies in the New York portion of the Chesapeake Bay watershed. Dedicated funding (up to $75,000 per county per year) enables the Soil and Water Conservation Districts to continually develop and implement AEM strategies and best management practices (BMP) implementation.

The careful coordination of a strong regulatory program with financial incentives and a strong local implementation team all based on sound science and applied research is the recipe for a successful agricultural water quality program. The success of the New York Program is clear.

According to the latest "progress run" modeling by USEPA R3, comparing 2002 to 2009 the agricultural nitrogen load delivered from New York decreased more than 27%[30]. (As previously noted, under USEPA R3's proposed protocols, however, New York gets no "credit" for this useful reduction in nitrogen loadings).

The proposed management practice implementation levels in this Draft Phase I WIP reflect practical implementation considering the type of agriculture conducted in New York, climate, social/economic and relevant site specific details, and an estimate of state and federal funding realistically expected to be available through 2025. Funding consists of $67.5 million from State sources, a large part of which is awarded in contracts[31] on a competitive basis (includes special request for funding received by Upper Susquehanna Coalition), and $75 million through various USDA/NRCS programs (includes the Chesapeake Initiative in Farm Bill).

New York State supports **"Environmental and Economically Sustainable Agriculture."**

The DEC has been working with both environmental and farming stakeholders in New York State for over a decade to achieve environmental compliance for all of New York State agriculture. New York State recognizes the historic, cultural, environmental and economic importance of maintaining agricultural viability in the Upper Susquehanna region. On-going communication is critical to finding ways to reduce the environmental impact of farms while protecting the open space, vistas, rural economic development, food, fiber and energy that they provide to all of us.

A carefully coordinated effort between the DEC, the New York State Department of Agriculture and Markets, New York State Soil and Water Conservation Committee and the Upper Susquehanna Coalition actively supports increased use and performance of conservation practices with management practice (BMP) implementation on farms through programs such as the Agricultural Environmental Management (AEM) program and the Agricultural Nonpoint Source Abatement and Control Program

[30] From 5,917,424 pounds in 2002 to 4,293,439 pounds in 2009.
[31] State staff review projects before costs are fully reimbursed.

(AgNPS). New York State contributes over $10 million annually statewide of Environmental Protection Funds (EPF) to these programs to implement practices on farms to protect water quality.

This coordinated effort to support environmental and economically sustainable agriculture works to document farm statistics and BMPs, develop watershed and site specific agricultural plans and implement and evaluate those practices. New York farmers are active stewards. More than 12,000 farms statewide of all types and sizes are involved in AEM, a program that responds to environmental needs with cost effective improvements that benefits farms and communities. Utilizing the tools the AEM program provides, the status of agricultural BMPs in New York is accurately documented by the Upper Susquehanna Coalition and reported to the Chesapeake Bay Program.

New York State has invested in an environmentally sound voluntary incentive based program that works. Since 1994, $90 million in State Environmental Protection Fund grants have been allocated through Soil and Water Conservation Districts, cost sharing more than 5,000 conservation projects on over 2,000 farms in 50 counties. Approximately 25% of these resources affect the Chesapeake Cleanup effort.

1. Concentrated Animal Feeding Operation

Following the first CAFO general permit issuance in New York in 1999, CAFO operators were required to obtain and comply with state wastewater discharge permits. Today, more than 10 years later, New York has one of the most robust CAFO permitting programs in the nation, covering 150 large and over 450 medium-sized CAFO farms. New York State's CAFO program is clear, actively implemented and enforced, of state-wide applicability, practical and scientifically supported. New York State recognizes the need for farm-specific, technical evaluations by qualified professionals, in the form of Certified Planners and Professional Engineers, to ensure that the farm understands and implements the latest developments in land grant university guidelines, United States Department of Agriculture Natural Resources Conservation Services (USDA-NRCS) technical standards and State regulatory requirements.

Since the start of the CAFO permitting program in 1999, New York has required New York Certified Planners to develop Comprehensive Nutrient Management Plans (CNMPs) for CAFO farms and Professional Engineers to design and certify NRCS engineering practices on farms. This type of science-based, risk reduction approach to CAFO regulation, developed and implemented by New York since 1999, should be considered the national standard; anything less is inconsistent with the Clean Water Act's "best technology" requirements. The historical lack of a consistent program nationally, and between Chesapeake Bay watershed states, that provides objective, consistent regulatory requirements on par with the New York program, has placed New York's CAFOs, along with CAFOs of other States that have sought to be good environmental stewards, at a competitive disadvantage. Nonetheless, the New York CAFO program has persisted in its efforts to afford superior protection of the environment through continued education, enforcement and applied research efforts. These efforts are supported by New York's regulated farms as documented by a very high rate of compliance.

New York's CAFO farms must comply with stringent technical standards designed to afford superior protection of the environment. These technical standards take the form of USDA-NRCS conservation practice standards and state regulatory requirements, both of which exceed the minimum requirements set by EPA and USDA-NRCS and are tailored to be most effective for New York's conditions based on applied research from Cornell University – New York's land grant university. As such, CAFO farms must utilize professional engineers in the design and implementation of their waste management

and storage structures, must adhere to stringent setbacks for nutrient applications in farmlands adjacent to New York's waters, must control erosion on crop fields and must make nutrient applications in accordance with science-based nutrient management plans. The CAFO program ensures that manure nutrients from medium and large livestock farms are recycled to grow crops rather than allowing those nutrients to reach the waters of New York State. It is these stringent technical standards and the CAFO program's proven rate of implementation and enforcement that protects water quality.

New York State regulates medium-size CAFOs in the same manner as it regulates large-size CAFOs. Most other states regulate medium-size CAFO under a separate program that is often voluntary in nature. A non-regulatory approach, for a sector that has a significant pollution potential (the smallest medium CAFO has the pollution potential of a major sewage treatment plant), is neither credible nor effective. Professional management of waste at these facilities is critical to protection of water quality. That professional management is ensured by the New York CAFO permit program.

New York Comprehensive Nutrient Management Program

Key among the permit's many requirements is the development, implementation and maintenance of a current Comprehensive Nutrient Management Plan (CNMP), written by a New York State certified planner and conforming to the technical standards established by the federal Natural Resources Conservation Service (NRCS). As a condition of the permit, the CAFO must have a Comprehensive Nutrient Management Plan (CNMP) developed by an AEM Planner certified through the New York's Agricultural Environmental Management (AEM) Program. Successfully becoming a Certified Crop Advisor (CCA) in the Northeast Region is the first step in obtaining certification to develop CNMPs for farm operations needing the CAFO permit in New York State.

The CCA program is one of the certification programs of the American Society of Agronomy (ASA) and is also governed by ARCPACS, a federation of certifying boards in agriculture, biology, earth and environmental sciences. The CCA program in New York is administered by the Northeast Regional CCA Board, which covers New York and all of the New England states. Nationally, a CCA is recognized by the USDA – Natural Resources Conservation Service (NRCS) as an individual who is qualified to service certain NRCS programs as a Technical Service Provider (TSP). In New York, a CCA is eligible to seek further certification, as an AEM Planner, to develop CNMPs required as a condition of the CAFO permit.

New York Technical Standards for BMPs

All CNMPs developed in New York must be prepared in accordance with "NRCS Conservation Practice Standard No. 312" and all applicable technical standards where invoked by NY312 (NY590, NY748, etc.). All New York NRCS technical standards meet and/or exceed the minimum national requirements as they are tailored to the stringent regulatory requirements and environmental sensitivities found in New York. The New York technical standards are reviewed and revised by a Standards Committee consisting of technical staff from NRCS, DEC, the New York State Department of Agriculture and Markets, Cornell University and others. These revisions under the oversight of the Standards Committee ensure state-of-the-art BMP implementation on New York farms.

Requirements to Become an AEM Certified Planner

1. Be a Certified Crop Advisor in good standing in the Northeast Region.
2. Complete an online 5-module course on the NRCS Planning Process and pass the associated exam with at least an 80% score (www.nedc.nrcs.usda.gov/catalog/consplan.html).
3. Attend a 4-day CNMP Training on the development of CNMPs. Completion of this step and being a CCA results in "Conditional Certification".
4. Have 3 CNMPs reviewed by a CNMP Review Team to determine if the plans appear to meet NRCS Standard New York-312 Waste Management System and requirements of the DEC CAFO General Permit, and that the planner has demonstrated full understanding of all components of the planning process. The final CNMP is reviewed in the field.
5. To maintain AEM Planner Certification an individual must maintain their CCA certification by earning CEUs and receive acceptable reviews through the AEM Planner Quality Assurance Program. (New York is one of the few states that conduct such ongoing Quality Assurance/Quality Control.)
6. An individual completing the steps outlined above is certified by the State Conservationist of the USDA-NRCS in New York in consultation with the Commissioner of the New York State Department of Agriculture and Markets to develop and/or approve CNMPs required to satisfy the conditions of the DEC CAFO General Permit or for USDA-NRCS and New York State cost share programs. The State Conservationist, in consultation with the New York State Agriculture Commissioner, may revoke an individual's certification for failure to maintain their CCA certification, or for not meeting NRCS standards in developing plans.

Certified Crop Advisor Requirements:

1. Pass two comprehensive exams (state/regional and international) that measure competency in four areas – soil and water conservation, nutrient management, integrated pest management, and crop production. Each exam may be attempted up to 3 times.
2. Subject your credentials including experience, education, and references to a peer review by the CCA Board. Minimum education and experience requirements include – appropriate BS degree with 2 years crop consulting experience, appropriate AAS degree with 3 years experience, or 4 full years of appropriate crop consulting experience. A reference must be provided by a client and employer outlining the candidate's crop consulting experience.
3. Sign and adhere to a Code of Ethics. A CCA pledges to work only in areas in which they are competent and give the highest quality advice. They are ethically bound to make recommendations that are in the best interest of the client and the public. An individual gaining CCA status must then earn 40 Continuing Education Units (CEUs) in a 2- year cycle to maintain their certification. A minimum of 5 CEUs must be earned in each of the previously mentioned competency areas, and the Northeast Regional CCA Board must sanction at least 10 of the CEUs.

CAFO program highlights:

- Since 1999, New York State has exceeded the federal minimum CAFO requirements by permitting over 450 medium-sized CAFO farms
- New York requires erosion control to "Tolerable Soil Loss" on all CAFO crop land, a technical requirement of NRCS NY590 for nutrient management
- No direct discharge of process water is permitted, except during extreme events
- In 2009, New York State once again exceeded the federal CAFO requirements through the issuance of the State Environmental Conservation Law permit for CAFO-sized farms
    - Covers dairies with 200 or more cows whether or not a process wastewater discharge to surface water is expected.
        - 65 permits, >45% of the total dairy animal numbers in Susquehanna basin
        - The federal CAFO program would require permits for only a small number of the New York permitted CAFOs
    - High level of regulatory oversight

- New York CAFOs in Susquehanna Basin **do not have excess manure**
    - 1.5 million tons manure generated
    - Over 72,000 acres covered by Comprehensive Nutrient Management Plans that meet the enhanced nitrogen field management practices of the New York State technical standard
        - Only about 50,000 acres needed for compliant land application of manure
    - New York exceeds the federal minimum manure application standards with more comprehensive nitrogen accounting in the New York State technical standard
    - Up to 65% of nitrogen losses through ammonia volatilization eliminated through management practice implementation of immediate manure incorporation

- CAFO compliance and enforcement activities include farm inspections, complaint investigations, issuance of Notices of Violation (NOV) and Orders on Consent for regulatory violations.
    - 50% of these CAFOs have had comprehensive DEC inspections
    - The frequency of inspections and subsequent follow-up actions will increase under the pending Chesapeake Bay Regulatory and Accountability Program grant to New York.
    - New York has assessed nearly $11million in penalties as part of the CAFO compliance and enforcement program.

2. Agricultural Environmental Management

The New York State Agricultural Environmental Management (AEM) Program goal is to support farmers in their efforts to protect water quality and conserve natural resources, while enhancing farm viability. Formalized in New York State law in 2000, New York's AEM program has aided farmers in protecting water quality. The driving principle of AEM's success is a farm specific focus, with a locally coordinated educational component to elicit landowner confidence.

AEM provides a forum to document the soil and water conservation stewardship farmers provide. It also provides information to farmers about Concentrated Animal Feeding Operation (CAFO) regulatory requirements, which helps to assure compliance. Details of the AEM program can be found at the New York State Soil and Water Conservation Committee (SWCC) website, http://www.NewYorks-soilandwater.org/aem/index.html.

Using a voluntary, yet highly interactive, approach to meet local, state and national water quality objectives, AEM has become the primary program for agricultural conservation in New York. It also has become the umbrella program for integrating/coordinating all local, state and federal agricultural programs. For instance, farm eligibility for cost sharing under the SWCC Agricultural Nonpoint Source Abatement and Control Grants Program (from New York's Environmental Protection Fund) is contingent upon AEM participation.

AEM core concepts include an incentive-based approach, attending to specific farm needs and reducing farmer liability by providing approved protocols to follow. AEM provides a coordinated and confidential planning and assessment method that addresses watershed needs. The assessment process increases farmer awareness of the impact farm activities have on the environment and by design, it encourages farmer participation, which is an important overall goal

The AEM Program relies on a five-tiered process:

- Tier 1 – Survey current activities, future plans and potential environmental concerns
- Tier 2 – Document current land stewardship; identify and prioritize areas of concern
- Tier 3 – Develop a conservation plan, by certified planners, addressing areas of concern tailored to farm economic and environmental goals
- Tier 4 – Implement the plan using available financial, educational and technical assistance
- Tier 5 – Conduct evaluations to ensure the protection of the environment and farm viability

3. Upper Susquehanna Coalition

The Upper Susquehanna Coalition (USC), established in 1992, is a network of 16 Soil and Water Conservation Districts (Districts) in New York and 3 in Pennsylvania that cover the entire headwaters of the Susquehanna River-Chesapeake Bay watershed. Districts were established throughout the country in the 1940's to implement conservation efforts. The Coalition works under a Memorandum of Understanding based on New York and PA state law that allows Districts to enter into multi-District agreements.

The USC's mission is to protect and improve water quality and natural resources in the Upper Susquehanna River Basin with the involvement of citizens and agencies through planning and implementation of conservation projects, education and advocating for water resources. All of the 19 Districts that make up the USC have been designated as the "lead" for water quality issues in their Counties and each has over 60 years of experience working with local landowners, natural resource partners, municipalities, industries and regulators on water quality issues.

The USC uses a "multiple barrier approach" for planning and implementation that addresses issues at the source, across the landscape and in the stream corridor. At the basin-wide scale, the USC uses its success in soil and water conservation as an active partner in the multi-state effort to restore the Chesapeake Bay and is the lead in New York for developing the agricultural nonpoint source implementation portion of New York's Strategy and this Draft Phase I WIP.

While individual Districts implement BMPs across a wide variety of land uses, the roles and techniques described have led the USC to focus on three core areas: Sustainable Agriculture, Stream Corridor Rehabilitation and Wetland Restoration. Each core area has a team leader and coordinator to facilitate effective and efficient implementation within each District and across the basin to meet local and regional water quality goals.

Sustainable Agriculture uses the New York State AEM Program as the basis for its planning and implementation on farms. The USC promotes prescribed grazing techniques, cow exclusion from streams and riparian buffers, nutrient management, cover crops, conservation tillage, barnyard clean water exclusion and other agricultural BMP's.

Stream Corridor Rehabilitation includes natural stream design, stream rehabilitation and stabilization, floodplain enhancement and the establishment of riparian buffers.

Wetland Restoration includes a comprehensive approach for wetland restoration, construction, conservation, protection and research. This approach serves to improve local water quality and the environment through nutrient and sediment reduction, the attenuation of floods and increasing wildlife and habitat diversity.

Central to the success of the USC is its 'vertical and horizontal' integration. The USC represents a basin wide distribution of natural resources professionals that has established relationships and partnerships with stakeholders at every level (local, state, multi-state and federal). The result has been a productive decades-long history of strengthening and promoting environmental stewardship and protecting water quality at all scales.

Upper Susquehanna Coalition highlights:

- Interstate Coalition of 19 Soil and Water Conservation Districts (16 New York, 3 PA) in Upper Susquehanna region (above Towanda, PA)
- Implements county-level AEM strategies (95% of dairy farms participating)
    - USC and NRCS implementation totals 2005-2009
        - 1,621 acres of Wetland Restoration
        - 377 acres of Wetlands Created
        - 17,278 acres of Prescribed grazing
        - 164 miles of stream fencing
        - 63,078 acres of Comprehensive Nutrient Management Plans
    - Precision Feed Management work is resulting in ~65% reductions in farm mass nutrient balances of Nitrogen and Phosphorus
- Receives Bay Program New York State Implementation Grant
    - Work plan includes in-field documentation of agriculture management practices and annual reporting to the Bay Program
- Institutes additional conservation efforts by integrating its model wetland program (Bay Program Wetland Champion role) and burgeoning stream restoration program into routine discourse with agricultural and other large landowners

4. Agronomy

Cornell University agricultural researchers have conducted nutrient mass balance evaluations[32]. This research identified that the agricultural lands in the Upper Susquehanna region of New York are in gross balance for phosphorus inputs and cropping systems. This is largely attributed to source reduction efforts including better feed rationing for phosphorus. Cornell research has also

[32] Swink, n.; Q.M. Ketterings; L.E. Chase; K.J. Czymmek; M.E. Van Amburgh (2010.) Nitrogen Balances for New York State: Implications for manure and fertilizer management. Journal of Soil and Water Conservation (in press.)

demonstrated a negative balance for nitrogen, with a 53% decrease in agricultural nitrogen from 1987 to 2007 for New York. These nitrogen deficiencies are partially the result of nitrogen losses from manure in the barn and waste storage systems – making implementation of management practices to further sequester nitrogen critical. From a nutrient perspective, there are no drivers to export manure in New York because all that is produced is presently recycled in our cropping systems.

Frugal farm management along with the robust outreach, extension and applied research efforts of New York's Cornell University have already established a neutral (if not negative) state of nitrogen and phosphorus in the New York land area of the Chesapeake Bay watershed and, as such, our agronomic focus is improved capture and distribution within the watershed.

5. Specific USEPA WIP Questions

The Watershed Implementation Plan guidance from USEPA R3 dated April 2, 2010 includes the following specific questions about agriculture:

1. Question: Is there a minimum set of management practices to be included in nutrient management plans? If so, how is the inclusion and implementation of these practices verified?

Answer: Yes. Comprehensive Nutrient Management Plans CNMPs and NMPs written in New York as part of the New York CAFO Program and AEM Program all utilize the minimum requirements of New York-NRCS Conservation Practice Standard 590 which includes the New York Land Grant University (Cornell) Guidelines for nutrient applications as well as soil conservation requirements. The Cornell nutrient guidelines are based on applied research and are actively maintained through on-going field trials with the goal of nutrient use and efficiency. Unlike the land grant university guidelines of some other states, Cornell recommendations do not allow for over application of nutrients under the guise of "insurance factors." Full CNMPs are developed according to NY-NRCS Conservation Practice Standard 312, which includes standard 590 as well as a long list of other standards to address manure/process wastewater concerns on farmstead facilities. These CNMPs and NMPs are written by New York State Certified Planners that undergo a rigorous training and continuing education process including a quality assurance program.

2. Question: How is phosphorus managed in soils?

Answer: In accordance with the New York P Index as per the requirements of NRCS New York-590

3. Question: How are appropriate agronomic rates determined for application of manure/biosolids/organic byproducts?

Answer:
Manure application rates are developed as part of a New York CNMP. The certified planner developing this plan utilizes an iterative approach that looks to restrict applications based on the field specific characteristics and risk assessments assigned by the nitrogen and phosphorus indices.

Contrary to some phosphorus indices, the New York phosphorus index does not allow for the disposal of manure. The New York phosphorus index considers phosphorus loss runoff risk based on both particulate and soluble phosphorus forms, reflecting predominant pathways for phosphorus runoff formation, and results in phosphorus application restrictions. The New York phosphorus index was

developed at Cornell University, based on local research, knowledge and conditions, and with input from professionals in State and Federal agencies. The New York phosphorus index has been in place for several years and where soil test phosphorus and transport risk potential is high, it has caused farms to change management of that field or apply manure elsewhere. The New York phosphorus index continues to undergo changes as greater insights are gained into phosphorus movement in our landscapes, but it is an effective tool for environmental protection[33].

Biosolid land application is extremely limited in New York. That which occurs is regulated via 6NYCRR Part 360.

B. Urban Runoff

To implement the federal phase II stormwater law, the DEC has developed two general permits, one for MS4s in urbanized areas and one for construction activities. The permits are part of the State Pollutant Discharge Elimination System (SPDES) program. Operators of regulated MS4s and operators of construction activities must obtain permit coverage under either an individual SPDES permit or one of the general permits.

To help localities comply with state and federal stormwater management requirements, in 2004, the DEC issued the Stormwater Management Guidance Manual for Local Officials. This manual addresses developing and implementing local stormwater management programs, and minimum measures 4 and 5 under the federal stormwater management program. The manual has been distributed to local governments in print format, with a compact disk that provides associated technical and permit documentation. This Guidance Manual contains information useful to local officials involved in stormwater management, whether in a regulated MS4 or in a community or institution that is not subject to the state/federal stormwater management rules.

1. Municipal Separate Storm Sewer Systems

Discharges from Municipal Separate Storm Sewer Systems (MS4s) in Urbanized or Additionally Designated Areas must be authorized in accordance with a permit for stormwater discharges from MS4s. The most recent MS4 permit is SPDES General Permit, GP-0-10-002, http://www.dec.ny.gov/docs/water_pdf/ms4gp2010.pdf. This permit was issued in April 1, 2010, and effective on May 1, 2010, and contains the bulk EPA recommended actions. The DEC requirements for regulated small MS4s are included in this document.

The following forms are needed to comply with the requirements of the General Permit for Stormwater Discharges from Municipal Separate Storm Sewer Systems GP-0-10-002:

- Notice of Intent to obtain coverage under the Municipal Separate Storm Sewer Systems General Construction Stormwater Permit - May 2010
- MS4 Stormwater Pollution Prevention Plan Acceptance Form Certification dated January, 2010.
    - This form is used by a regulated, traditional land use control Municipal Separate Storm Sewer System (MS4) (e.g. town, city or village) to indicate acceptance of a SWPPP it has reviewed.
- MS4 Municipal Compliance Certification and Annual Report Form for MS4s implementing their SWMP dated March, 2010.

[33] Czymmek, K.; Q. Ketterings; L.Chase, L. Geohring. (2010) The New York Phosphorus Site Index: The Sky is Not Falling. Bay journal (submitted)

Instructions for Completing the Municipal Compliance Certification Form and MS4 Annual Report for 2009-2010, including;

- Evaluations of progress toward measurable goals
- Description of measurable goals accomplished
- Observations of overall effectiveness of measurable goals
- Monitoring data
- Future planned activities

DEC has a comprehensive enforceable program in place for covered areas. Highlights are:

- Only 3% of land area in New York Chesapeake watershed is urban/suburban
- 2 relatively small urbanized areas (Binghamton, Elmira), 26 municipalities
    - The 26 municipalities are small Phase II MS4s
        - Additional Phase II MS4 designations (based on 2010 census) may expand the existing Elmira urban area by including the City of Corning and other neighboring municipal areas, roughly doubling in size the current Elmira urban area.
- 2010 MS4 permit renewal exceeds federal minimums
    - Permit coverage (construction and post-construction controls) extends beyond urbanized areas to municipal boundaries[34]
    - Prescriptive requirements for compliance with design manual, including rigorous green infrastructure requirements.
- Post construction controls are required to be designed a professional engineer (developer) and reviewed by a professional engineer (MS4 permittee)
- Statewide over 2,000 municipal staff were trained to perform construction site inspections
- DEC evaluates progress through review of annual reports and site audits
    - Statewide DEC took six formal enforcement actions regarding MS4 permits in the last quarter of 2009 state fiscal year (from Jan 1 to April 31, 2010)
    - The frequency of inspections and subsequent follow-up actions will increase under the pending Chesapeake Bay Regulatory and Accountability Program grant to New York.
- Current estimate of monthly mechanical street sweeping by MS4s is 700,000 feet. Expect this will ramp up to 2,000,000 feet monthly.

2. Construction Stormwater

According to the USEPA R3 watershed model about 0.3 % of land in this part of New York is disturbed by construction activity.

Before commencing construction activity, the owner or operator of a construction project that will involve soil disturbance of one or more acres must obtain coverage under the State Pollutant Discharge Elimination System (SPDES) General Permit for Stormwater Discharges from Construction Activity (GP-0-10-001). This permit is available at: http://www.dec.ny.gov/chemical/43133.html). This permit was issued in January 2010, and was effective on January 29, 2010. DEC requirements for construction activities are included in this document.

[34] USEPA R3 model may not reflect current and future MS4 boundaries.

Owner/operators with projects covered under the SPDES General Permit for Stormwater Discharges from Construction Activity are required to develop and implement a Stormwater Pollution Prevention Plan (SWPPP) that meets criteria set forth by New York State DEC. All SWPPPs must include practices consistent with the New York Standards and Specifications for Erosion and Sediment Control. Many construction sites must also comply with the New York State Stormwater Management Design Manual to control post-construction stormwater discharges.

The DEC Stormwater Toolbox provides links to sources of technical information needed to comply with the requirements of the Construction Permit and references that are useful for the design of stormwater management practices. Although it is primarily intended as a resource for consultants and other design professionals, it may also be helpful to local officials and others involved with stormwater management. Among those points of interest to stakeholders, is the Construction Notice of Intent (NOI) Database, which includes information provided to the Department in NOIs submitted to obtain coverage under the Construction Permit.

The Stormwater toolbox includes:

- **New York Standards and Specifications for Erosion and Sediment Controls** (2005): "The Blue Book" provides standards and specification for selection, design and implementation of erosion and sediment control practices, including Engineering Schematics for Erosion and Sediment Controls.
- **New York State Stormwater Management Design Manual** (August, 2010): Provides standards and specifications for selection and design of stormwater management practices to comply with State stormwater management performance standards. The 2010 updates include planning and design based on Green Infrastructure principles.
- **New York State Verified Proprietary Stormwater Management Practices**: Provides proprietary stormwater management practices that meet the performance criteria in the NYS Stormwater Management Design Manual
- **Construction Stormwater Inspection Manual**: This manual is for use of state or municipal construction inspectors in performing compliance inspections, as well as for site operators in performing self-inspections. An inspection form, used by MS4s to document inspections of constructions sites is included in the manual.
- **Better Site Design** - April 17, 2008: This document provides guidance to developers and designers to plan for and implement environmentally sound designs for new development and redevelopment projects while reducing the effects of stormwater runoff through both regulatory and non-regulatory techniques.
- **Deep-Ripping and Decompaction:** The two phase practice of 1) Deep Ripping and 2) Decompaction (deep subsoiling) of the soil material as a step in the cleanup and restoration/landscaping of a construction site, helps mitigate the physically induced impacts of soil compression (i.e. soil compaction or the substantial increase in the bulk density of the soil material.)

The following forms are needed to comply with the requirements of the General Permit for Stormwater Discharges from Construction Activity - GP-0-10-001:

- Notice of Intent - is a request for coverage under the General Construction Stormwater Permit.
    - The Instruction Manual for completing the Notice of Intent is found in the Construction Toolbox, http://www.dec.ny.gov/chemical/8694.html

- Notice of Termination for Construction Activities dated January, 2010
    - When a construction project is complete and has met the requirements of the construction permit, a Notice of Termination (NOT) form should be completed and submitted to the Department.
- MS4 SWPPP Acceptance Form dated January, 2010
    - This form is used by a regulated, traditional land use control Municipal Separate Storm Sewer System (MS4) (e.g. town, city or village) to indicate acceptance of a SWPPP it has reviewed.

New York State has adopted a program that is more comprehensive than the national minimum. Unlike EPA's national program New York requires a full suite post-construction water quality and quantity controls on any site over 1 acre, with few exceptions[35]. Highlights are:

- Historically New York State has exceeded the federal minimum Construction Stormwater Permit requirements by including post-construction controls to address both water quality (nutrients) and quantity for both development and redevelopment projects
    - Quality performance standard is 80% removal of total suspended solids and 40% removal of total phosphorus
    - For quantity, stream channel protection, overbank flood control and extreme flood control criteria are applied
- In 2010, New York State further exceeds the federal minimum Construction Stormwater Permit requirements by:
    - Adding rigorous green infrastructure requirements
    - Issuance of a fully updated, state-of-the-art technical design manual
- Requires conformance with detailed design, construction, operation and maintenance, and performance standards of specific control practices that address both water quality and quantity impacts
- Requires inspections by qualified professionals

New York evaluates and verifies post construction implementation from its statewide database of Notice's of Intent submitted for coverage under the DEC SPDES General Permit for Stormwater Discharges from Construction Activity.

A DEC SPDES Compliance Summary Report shows that of approximately 6,800 NOI's statewide received in 2009 state fiscal year (April 1 to April 1), DEC conducted about 500 inspections and that about 100 of these were deemed unsatisfactory. Statewide DEC took 47 formal enforcement actions regarding construction permits in the 2009 state fiscal year. In addition, DEC's environmental conservation officers conducted another 800 inspections during the summer of 2009, leading to another 40 enforcement actions. The frequency of inspections and subsequent follow-up actions will increase in the Susquehanna region under the pending Chesapeake Bay Regulatory and Accountability Program grant to New York.

[35]Construction activities that require stormwater pollution prevention plans that only include erosion and sediment controls include soil disturbances of one (1) or more acres of land, but less than five (5) acres for: 1) Single family home not located in one of the watersheds listed in Appendix C and not directly discharging to one of the 303(d) segments listed in Appendix E, 2) Single family residential subdivisions with 25% or less impervious cover at total site build-out and not located in one of the watersheds listed in Appendix C and not directly discharging to one of the 303(d) segments listed in Appendix E, and 3) Construction of a barn or other agricultural building, silo, stock yard or pen.

Requirements for Well Drilling Activities: On April 1, 2010 DEC issued SPDES General Permit for Stormwater Discharges from Construction Activity (GP-0-10-001) - Requirements for Well Drilling Activities. These requirements apply to well drilling activities that are consistent with the 1992 Generic Environmental Impact Statement (1992 GEIS) for oil and gas well drilling.

DEC is requiring Construction Stormwater General Permit Coverage for Article 23 Drilling Activities (non-high volume hydraulic fractured wells) that are not covered by the Multi-Sector General Permit. Generally, this means that well activities requiring an Article 23 well drilling permit which disturbs one or more acres of land must also obtain coverage under the DEC General Permit for Stormwater Discharges associated with Construction Activity.

3. Residential Fertilizer Use

Legislation was signed into New York law on July 15, 2010[36], to limit the use residential fertilizer containing phosphorus holds promise to reduce phosphorus in urban runoff.

A new Environmental Conservation Law §17-2103 will prohibit the application of phosphorus fertilizer on lawn or non-agricultural turf, except when: (1) a soil test demonstrates that additional phosphorus is needed for lawn or non-agricultural turf growth, or (2) new lawn or non-agricultural turf is being established. A new ECL § 17-2103 requires retail stores to comply with the requirements of Agriculture and Markets Law § 146-g related to the display of phosphorus fertilizer and the posting of educational signs. It would also prohibit the application of fertilizer on lawn or non-agricultural turf: between December first and April first; on impervious surfaces; and within twenty feet of surface water except where there is a continuous vegetative buffer of at least ten feet from the water body, and except that, where a spreader guard, deflector shield or drop spreader is used, the application would be prohibited within three feet of a New York surface water. The setbacks from surface water would not apply when establishing a new lawn. This new Title 21 will not impair or supersede the authority of the Commissioner of Agriculture and Markets under Articles 10 and 25-AA of the AML.
ECL §17-2105 will allow local governments to adopt more stringent standards for non-agricultural fertilizer applications after demonstrating to the Department that such action is necessary to address local water quality conditions.

Section 4 of this bill will add a new ECL § 17-1945 to provide for the enforcement of Title 21 of Article 17. This new section will provide that a New York owner, owner's agent or occupant of a household who violates a New York provision of Title 21 would receive a written warning and educational materials for a first violation, be liable for a civil penalty not to exceed $100 for a second violation, and be liable for a civil penalty not to exceed $250 for third and subsequent violations. A New York other person who violates a New York provision of Title 21 would be liable for a civil penalty not to exceed $500 for a first violation, and not to exceed $1,000 for each subsequent violation.

Section 6 of this bill will add a new section AML § 146-g to require retail stores that sell or offer to sell to consumers specialty fertilizer in which the available phosphate content is greater than 0.67 percent to display such fertilizer separately from non-phosphorus specialty fertilizer, and to post a sign in the location where phosphorus-containing specialty fertilizer is displayed stating that phosphorus runoff poses a threat to water quality, and therefore phosphorus-containing fertilizer may only be applied to lawn or non-agricultural turf when a soil test indicates a phosphorus deficiency or new lawn or non-agricultural turf is being established

[36] http://open.nysenate.gov/legislation/bill/S3780B

C. Wastewater

1. Bay-Significant wastewater treatment plants

- 28 facilities in New York (26 municipal, 2 industrial)

None of the Bay-significant discharges are to receiving waters with phosphorus impairment.

As described in the 2006 New York State Tributary Strategy for Chesapeake Bay Restoration, DEC first fulfilled a fundamental information need by issuing State Pollutant Discharge Elimination System permit modifications in 2005/6 to add complete nutrient monitoring. Then, as also described in the Strategy, the DEC began issuing SPDES permit modifications in 2008[37] that require maintenance of current nutrient removal performance (nutrient action levels based on prior minimum of two years of effluent data collection) and include a schedule of compliance requiring the implementation of nutrient removal optimization (goal to achieve discharge of 2.0 mg/l of phosphorus and 12mg/l nitrogen) and engineering analysis of feasibility and costs of greater levels of treatment. The intent of the engineering analysis is to gather reliable facility specific data, including costs, to help DEC identify appropriate site specific remedies and priorities of subsequent capital investment in such significant infrastructure.

Following is an example of the text of the nutrient action level and optimization/analysis compliance schedule in issued permits:

CHESAPEAKE BAY ACTION LEVELS AND MONITORING

PARAMETER	MONITORING ACTION LEVEL			UNITS	SAMPLE FREQUENCY	SAMPLE TYPE	LOCATION		FN
	12 MRA	Monthly Average	Daily Max.				Influent	Effluent	
Phosphorus, Total (as P)	varies	Monitor	Monitor	mg/l	varies	varies	X	X	3.4
Phosphorus, Total (as P)		Monitor	Monitor	lb/d			X	X	3,4
Nitrogen, Total (as N)		Monitor	Monitor	mg/l				X	3,4
Nitrogen, Total (as N)		Monitor	Monitor	lb/d		.		X	3,4

FOOTNOTES: (3) Action Levels apply as a 12 month rolling average (12 MRA)

(4) **Chesapeake Bay Nutrient Action Level Requirements** - Total Nitrogen and Total Phosphorus requirements are numerical action levels rather than effluent limits. Exceedance of these action levels does not constitute a permit limit violation. However, if one of these action levels is exceeded, then the permittee shall submit a written report which: summarizes the period during which the exceedance occurred; and, describes the cause, immediate corrective actions taken, and long-term corrective actions taken to minimize nutrient levels in the discharge. This report shall be submitted within 30 days of the date the action level is exceeded to the Chesapeake Bay Program Coordinator (NYSDEC, 625 Broadway, Albany, NY 12233-3502) and Regional Water Engineer. Please note that the typical Type I and Type II action level rules, described elsewhere in this permit, do not apply here. Total Nitrogen shall be calculated as the sum of Total Kjeldahl Nitrogen (TKN), nitrate and nitrite. In addition to these action levels, it is also possible to have effluent limits specified for one or more nutrients due to local water quality concerns.

[37] To date 23 of 27 "action level –optimization "permit modifications have been issued to the Bay-significant WWTPs, the remaining will be issued this year.

SCHEDULE OF COMPLIANCE

a) The permittee shall comply with the following schedule:

Action Code	Outfall Number(s)	**Compliance Action**	Due Date
25099	001	The permittee shall submit an approvable engineering report which contains recommendations for improving nutrient removal without a major capital upgrade of the permittee's treatment process. The goal is to reduce effluent concentrations of total nitrogen to 12 mg/L or less and total phosphorus to 2.0 mg/L or less, or to achieve an equivalent reduction in the effluent mass load to the receiving water. The report shall address options, including but not limited to, chemical addition, biological or other process operational adjustments, waste stream reduction, pretreatment of industrial users, improved management of hauled waste receipts, and effluent re-use. The permittee shall also identify cost-effective strategies to achieve greater levels of treatment, considering a range of effluent nutrient concentrations from current conditions down to the equivalent of levels achievable using best available technology (BAT). BAT is defined as effluent concentrations of total nitrogen of 5 mg/L and total phosphorus of 0.5 mg/L. These conditions may include changes in plant process control and major capital construction. The necessary technologies and estimated costs shall be summarized. However, such capital upgrades will not be required at this time. Permittees may use findings from existing engineering evaluations or conduct their own evaluation.	EDP + 6 months
		These recommendations to improve nutrient removal without a major capital upgrade shall be implemented as soon as practicable and no later than **EDP + 18 months**.	EDP + 18 months

b) The permittee shall submit a written notice of compliance or non-compliance with each of the above schedule dates no later than 14 days following each elapsed date, unless conditions require more immediate notice as prescribed in 6 NYCRR Part 750-1.2(a) and 750-2. All such compliance or non-compliance notification shall be sent to the locations listed under the section of this permit entitled RECORDING, REPORTING AND ADDITIONAL MONITORING REQUIREMENTS. Each notice of non-compliance shall include the following information:

1. A short description of the non-compliance;
2. A description of any actions taken or proposed by the permittee to comply with the elapsed schedule requirements without further delay and to limit environmental impact associated with the non-compliance;
3. A description or any factors which tend to explain or mitigate the non-compliance; and
4. An estimate of the date the permittee will comply with the elapsed schedule requirement and an assessment of the probability that the permittee will meet the next scheduled requirement on time.

c) The permittee shall submit copies of any document required by the above schedule of compliance to NYSDEC Regional Water Engineer at the location listed under the section of this permit entitled RECORDING, REPORTING AND ADDITIONAL MONITORING REQUIREMENTS and to the Bureau of Water Permits, 625 Broadway, Albany, N.Y. 12233-3505, unless otherwise specified in this permit or in writing by the Department.

Phosphorus Improvement Program

- Stage I: Required treatment optimization to achieve goal equivalent of 2.0 mg/l

- Stage II: Achieve design-flow based[38] Waste Load Allocations commensurate with the Strategy's overall reduction goals in an accelerated time frame through:

[38] New York is concerned with the fairness of offset programs based on design flow when excessive unused capacity exists and will address this in public comments.

- Permit modifications with effluent limits and binding schedules of compliance, with interim milestones as needed, beginning after 2011 when watershed model revisions and allocations are completed, as indicated in USEPA R3 June 11, 2010 correspondence
- Resulting chemical flocculation and/or filtration treatment
  - With model completion and final allocations, treatment type (associated performance-based limits) may depend on what discharge volume is ultimately used to determine Waste Load Allocation and consideration of potential growth thresholds to effect staged implementation of increasingly higher levels of treatment
- Innovations, such as effluent reuse and discharge relocation
  - The following will also assist with nitrogen load reduction
    - One municipal WWTP is currently implementing a natural wetland treatment demonstration project
    - Natural gas drilling companies are approaching municipal WWTP operators regarding the use of treated effluent for hydraulic fracturing
  - One municipality has already reduced its WWTP phosphorus input by not injecting phosphorus containing substances into its municipal water supply system for corrosion resistance
- Discharge load cap(s) as 12-month rolling annual average
  - Load caps either in total or individually[39]
- Legislation in New York to limit the concentration of phosphorus in automatic dishwasher detergent, not already covered by 1970s era legislation that essentially banned phosphorus in household cleaning products.
  - This legislation was enacted on July 15, 2010 (http://open.New Yorksenate.gov/legislation/bill/S3780B)

DEC analysis shows that subsequent issuance of discharge permits under this TMDL is expected to remain consistent with the water quality base effluent limits of potential future phosphorus water quality criteria in New York.

DEC expects to analyze the information currently being gathered through the submission of the required engineering reports (assisted by CBRAP Grant) and TMDL public comments and establish a targeted schedule for the necessary SPDES permit modifications so that high value projects are developed prior to 2017, seeking to meet goal of 90% of phosphorus reductions (refer to table 5).

Nitrogen Improvement Program

- Stage I: Achieve equivalent of 60% performance improvement (Biologically Aerated Filter technology) at Binghamton-Johnson City WWTP
  - Represents, on average, more than 30% of the total New York WWTP discharge load

As prescribed in its SPDES permit, this facility is undergoing a 2-year treatability study to determine its final performance based effluent limit. Expectations are that the nitrogen concentration limit will be between 4 and 6 mg/l. (Because this +/- $70million comprehensive upgrade was designed before the Bay Program intimated phosphorus removal expectations, its

[39]Prior to full implementation of the phosphorus and nitrogen improvement program, DEC will consider whether to document significant WWTP loading individually, under a single aggregation, or bubble, or a combination of two.

phosphorus limit will also be a function of measured BAF performance over the same two year treatability study period.)

Stage II: Achieve SPDES permit prescribed treatment optimization goal equivalent of 12.0 mg/l at other Bay-significant WWTPs

- Discharge load caps as 12-month rolling annual average
  - Load caps either in total or individually
- A higher level of nitrogen removal treatment is not expected because:
  - WWTPs contribute a smaller fraction of New York's nitrogen load (about 15 percent in 2009), making local investment in large capital and energy consuming treatment technology practices impractical
  - No actual benefit to immediate receiving waters
  - USEPA R3 "everything everywhere by everybody" baseline definition that a discharge at 3.0mg/l TN is universally applicable across the watershed does not consider the climatic differences across the watershed which affect the ability to achieve this level of performance – nitrogen treatment systems are not as effective in colder climates
  - USEPA R3 model runs reveal a 10:1 ratio of edge of stream load to delivered load

DEC expects to meet 100% of these nitrogen reductions by 2017.

New or Expanded Bay-Significant facilities (>400,000 gpd)

- Permit nutrient limits for new significant facilities will be 0.5 mg/l TP, 5.0 mg/l TN
- Resulting additional loads will need to be offset.
  - Because of the general downward trend in population, such new large Bay-significant facilities are not expected to arise
  - Offsets would need to be addressed in individual discharge permits. If offset is based on the accomplishment of nonpoint source nutrient reduction the DEC will first have to establish a rigorous process to ensure such offsets are verifiable and trackable[40].
- Expansions will need to offset any additional loads
  - Offset credit would include elimination of septic discharges by connection

2. Combined Sewer Overflows – 3 Systems

- Johnson City (SPDES No. NY0023981 and Binghamton SPDES No. NY0024406)
  - Both completed Long Term Control Plans in October 31, 2002
  - The new Binghamton-Johnson city WWTP system currently exceeds the federal CSO policy requirements for primary treatment through the addition of capacity to treat 85% of the wet weather flow (approximately 60 MGD). Average annual flow is about 20 MGD
    - Secondary treatment is required for all flow up to 50 MGD
    - Tertiary treatment is required for all flow up to 35 MGD
- Elmira
  - One district has eliminated its CSOs

[40] Past experience with such offsetting mechanisms in New York suggest that a superior, resource intensive effort would be needed to meet the stringency necessary to ensure true accurate and complete verification of such offsets

- The second district (SPDES No. NY0035742) has submitted a LTCP that is under review

- Recommend USEPA R3 apply its default interim value for CSO Waste Load Allocation based on its assessment of load and 85% reduction from the implementation of Long Term Control Plans.

3. Bay-Nonsignificants (<400,000 gpd)

- Gross Waste Load Allocation includes enough estimated load to cover these small sources, subject to verification program
  - Existing and new facilities <50,000 gpd:
    - Legislation limiting the phosphorus concentration in automatic dishwasher detergent will conservatively reduce effluent load by an estimated 10% from these facilities, many of which have simple treatment processes not amenable to additional phosphorus removal.
  - Existing facilities between 50,000 gpd and 400,000gpd
    - At present there are about 45 discharges with total permitted discharge volume of about 8 MGD
- New facilities between 50,000 gpd and 400,000 gpd
  - Seek to include nutrient removal treatment
    - For instance, new facilities at existing communities of Whitney Point and West Windsor have nitrogen and phosphorus limitations of 8 mg/l and 1 mg/l, respectively
      - These and other corrective actions involving inadequate on-site systems should get nitrogen reduction credit for the septic systems they replace
  - Additional load will need to be offset.
    - Offsets would need to be addressed in individual discharge permits.

D. Septic System

USEPA R3 estimates that about half of the residential population in this area of New York, or about 300,000 people, are served by about 120,000 Septic systems or on-site wastewater treatment systems (OWTS).

Because studies show that most of the nitrogen from OWTS is removed by natural processes in soil, the Bay Watershed Model attributes only about 10 pounds of nitrogen per year to streams for each system.

Residential OWTS are regulated by the New York State Department of Health (DOH), or are delegated to county health departments. DOH construction standards for new and replacement systems were updated in 1996. Larger OWTS, including private, commercial and institutional systems, are regulated by the DEC. Construction standards for these systems are found in the DEC's 1988 Design Standards.

The DEC and DOH have worked together to identify and prioritize resolution of rural areas with clusters of sub-standard systems and/or direct discharges. The Susquehanna and Chemung Watershed and Restoration and Protection Action Strategy (WRAPS, 2002) was based on such a process and identified six municipalities that applied for or received funding to correct the OWTS problems.

Several of these sites have since been corrected. The WRAPS also recommended that 12 areas should begin studies and obtain funding to develop centralized wastewater treatment facilities and/or OWTS management districts. Remaining sites are a priority. The State Revolving Fund, Environmental Protection Fund and County Water Quality Committee Mini-Grants are available to communities to help resolve OWTS problems.

In addition, the DEC has identified sub-standard OWTS as a significant contributor to pollutants in urban stormwater runoff. Municipal separate storm sewer system operators are required to implement a process to identify and eliminate such illicit connections. This requirement is expected to reduce the number of sub-standard systems in urban areas.

While New York State does not routinely inspect residential OWTS, several watershed based programs have developed. In some areas, such as Lamoka - Waneta Lakes and Otsego Lake local inspection and enforcement programs exist. The Otsego Lake watershed is also the site of a demonstration project intended to increase the knowledge and understanding of advanced OWTS, including increased phosphorus removal capability.

As a means to protect water resources in a cost-effective manner, municipal management of OWTS is encouraged. The DEC encourages municipalities to conduct OWTS inspections and to develop OWTS management strategies. Nine such projects were awarded state grants in 2005. A local initiative in Schuyler County has used funding from various sources to cost-share replacement of failing or antiquated septic system components.

To further assist municipalities, the DEC is involved in the development of a statewide training program for OWTS professionals. A largely volunteer industry group called the Onsite Wastewater Treatment Training Network (OTN) has been formed. The Department has provided financial and staff support to the OTN.

A GIS-based inventory and tracking software now includes a module that local officials, watershed professionals and consultants can use to inventory and map septic systems. In addition to attributes such as tank size and material, the module allows linking photographs, plans and inspection records to each system. An inspection form has been developed by the OTN and is available for use in this system.

Because OWTSs make up a minor fraction of the total nitrogen load and because de-nitrifying systems are expensive (about $10,000/system), DEC does not consider it practical to expect major nitrogen reductions from OWTS. Although there could be isolated instances where additional nitrogen removal systems may be needed to meet local groundwater quality standards, de-nitrifying systems are not included in this plan.

Program highlights:

- New residential systems less than 1,000 gpd are required to achieve specific design criteria in New York State Department of Health regulations (Part 75-A)

- DEC requires all subsurface discharges greater than 1,000 gpd to obtain State Pollutant Discharge Elimination System permits and to adhere with New York State groundwater water quality standards
    - For sanitary subsurface systems greater than 30,000gpd, compliance with groundwater effluent standards for nitrate is required

- Proposed Enhancement: Seek aggressive pursuit of eliminating direct discharges or inadequate systems with emphasis on areas identified in the 2002 Susquehanna and Chemung River Basin Watershed Restoration and Protection Action Strategy.

E. Forest

Harvesting

The New York Chesapeake Bay Watershed is about 75% forested. About 1% is harvested annually and about 23% of that has forest harvest water and soil resource protection BMPs installed as part of the harvesting activity.

The DEC BMP Field Guide is a practical tool for loggers, foresters and landowners. It presents suggestions, guidelines and technical references on a variety of timber harvesting practices, including skid trails, haul roads and landings. The guide is to be used as a menu of options to protect soil (and phosphorus), water and timber resources from loss or degradation.

Such BMPs are installed due in part to recommendations of a forest management plan (Forest Stewardship Program & Other Plans), or are required per Section 480a of the Real Property Tax Law on Certified tracts or required in Sales Agreements for timber harvests on DEC managed Multiple Use, Reforestation and Unique Areas collectively known as State Forests.

The installation of forestry BMPs are identified as a means to reduce the emission of nutrient and sediment that might otherwise be introduced into waters within the watershed during timber harvesting activities.

Estimates of management plans acres, Forest Tax Law tract acreage and actual State Forest timber sale acreage were used to generate an estimate of the number of acres on which timber was harvested pursuant to a management plan or statutory requirement that resulted in the installation of forestry BMPs.

Although there will be some annual fluctuation, the above annual estimate of managed forest harvest acres is expected to be constant. Yet, this figure may be underestimated. For instance, some Chemung County municipalities require the use forest harvest BMPs on all harvesting and not all of this may be captured in the state's data.

F. Atmospheric Deposition

In excess of 34% of the Chesapeake Bay's nitrogen loading is estimated to be from air deposition[41]. Atmospheric deposition is a significant load to all land use categories. Because approximately half of New York's allocation of nitrogen is attributed to forest (including small amount of non-tidal water deposition) and the impracticality of reducing nitrogen runoff from such extensive forestlands, it is

[41] Executive Order 13508 202a report, September 2009

necessary to heighten the focus on the Chesapeake "air-shed" which is significantly different than the watershed.

New York is a national leader in air quality controls and has already undertaken significant actions, including the following:

- Adoption of strict year-round NO_x controls at power plants and other stationary sources. Because nitrogen deposition during cold weather months is most likely to result in nitrogen losses to runoff, for reasons described above, this control will likely have the most significant effect.

- Adoption of the low-emission-vehicle (LEV) standards for nitrogen oxides.

- The Regional Greenhouse Gas Initiative (RGGI), under which seven northeast states, including New York and Delaware, have agreed to implement a cap-and-trade program to lower CO_2 emissions. This is the first such mandatory program in United States history. The RGGI allows carbon offsets, including sequestration of carbon due to afforestation and avoided methane emissions from agricultural manure management operations. Thus, the RGGI may provide resources through offset mechanisms to increase practices that support implementation of this strategy.

- Renewable Energy Portfolio Standard, which targets renewable energy as 25 percent of the electrical energy sold at retail in New York State by 2013. A Public Service Commission order authorized funds collected by utilities be used to help renewable energy projects get financing. Examples of projects under review within the Susquehanna/Chemung basins include more than 300 MW of wind power. The Renewable Portfolio Standard may also financially support farm digester production of methane and electrical generation.

- In 2005, the New York State Environmental Board approved state regulations that require significant reductions in greenhouse gas emissions from motor vehicles (LEV for carbon dioxide).

It is difficult to directly quantify the nitrogen reduction benefits of the last three initiatives, but they are likely to reduce nitrogen emissions by reducing fossil fuel consumption.

New York's nitrogen allocation in 2003 accounted for atmospheric deposition reductions that were projected from the EPA Clear Skies Initiative. Since then, EPA promulgated the Clean Air Interstate Rule (CAIR) to require substantial reductions in nitrogen oxides from power plants. The EPA estimates that CAIR will result in significantly less nitrogen being delivered to Chesapeake Bay.

New York has regulatory and other air program initiatives that likely will result in more reductions, as will some of the agricultural practices outlined in this plan. Although model quantification of these reductions is not available at this time, when coupled with a better understanding of actual atmospheric deposition of nitrogen and its fate and transport in forested watersheds, a high level of nitrogen reduction is expected.

G. Other Key Program Areas

1. Floodplains

Floodplains play an important hydraulic function in river systems. Undisturbed floodplains dissipate flood water energy and allow flood waters to infiltrate native soils. These functions reduce erosion potential and facilitate natural processes to attenuate nutrients. In addition, disturbance of structures and fill materials during a flood inevitably lead to deposition of large quantities of sediment and other debris that contribute to violations of the state narrative water quality standard for deposition (which is none in amounts that will impair the best usage of the water body.) Further, such sediments will carry nutrients and other contaminates that have the reasonable potential to cause or contribute to violations of water quality standards. Improved local government administration of its floodplain development regulations will reduce nutrient and sediment transported downstream during flood events. This will be accomplished by enhancing the current FEMA/State program, whereby the New York State Department of Environmental Conservation conducts Community Assessment Visits and Community Assistance Contacts, works with municipalities to take corrective actions and reports resulting findings to FEMA.

Although not directly regulated, under pending CBRAP grant DEC will augment its work, under contract with FEMA, to audit/assist local government administration of floodplain development regulations enacted for participation in the National Flood Insurance Program. DEC will also assist municipalities with implementation of flood damage reduction programs that exceed federal standards and protect floodplain functions.

A focus will be restoration of the hydraulic function of floodplains, especially regarding smaller headwater streams that have often been isolated due to historic human alterations of stream beds and banks in an effort to limit out of bank flooding and resulting field scour or other perceived and/or real damages, and to retain the function of undeveloped floodplains.

- ***Stream Processes: A Guide to Living in Harmony with Streams (2007)***
  Developed by the Southern Tier Central Regional Planning and Development Board and Chemung County, this innovative guide describes how streams work and why functioning floodplains are integral parts of stream systems. The guide contains dramatic photographs that help promote the need for sound management practices. It already has had a positive effect on decisions made by Chemung County landowners and local highway departments. It can be found at the Chemung County Soil and Water Conservation District website, http://www.chemungcountyswcd.com/homepage.html.

2. Ecosystem-based watershed planning

Through an American Reinvestment and Recovery Act water quality planning grant from DEC, the Southern Tier Regional Planning and Development Board is developing a Susquehanna-Chemung Action Plan based on an ecosystem approach to watershed planning. The Action Plan is to be completed by the end of 2011. This plan will be a concise, highly accessible public document that provides a unified vision for the region and promotes funding for water resource projects that benefit the Basin's residents.

Its draft goals include:

- Capitalizing on water resources as economic assets
- Maintaining clean and abundant water supplies

- Living in harmony with streams
- Being prepared for floods
- Preserving the rich diversity of plant and animal life
- Slowing rainwater down, spread it out and soak it in
- Supporting sustainable agriculture and forestry
- Navigating toward better roadway drainage
- Connecting people to nature
- Cultivating a watershed ethic

While not readily translatable into USEPA Bay Watershed Model inputs, this project is expected to yield demonstrable water quality and water quantity related benefits.

3. Marcellus Shale

Current uncertainty regarding the details of how this vast natural gas reserve will be developed in New York and its impact on the landscape makes nutrient and sediment related watershed implementation planning uncertain. The uncertainty and potential results are significant enough to warrant USEPA R3 to consider this Draft Phase I Watershed Implementation Plan to be an interim plan pending completion of New York's regulatory framework for high volume hydraulic fracturing.

The issuance of drilling permits for high volume hydraulic fracturing is currently suspended pending completion of New York State's comprehensive review of the potential environmental impacts of oil and gas drilling and production and how they are mitigated prior to permitting high volume hydraulic fracturing. (ref: http://www.dec.ny.gov/energy/46288.html)

New York expects a full suite of environmental controls to apply (the federal government has "de-regulated" these sites), including:

- Sites to obtain coverage under the Multi-Sector State Pollutant Discharge Elimination System General Permit for stormwater discharges
- Erosion and sediment control and post-construction stormwater management on all facets, including well pads, access roads and pipelines
- Spill prevention, control and countermeasures, including secondary containment for process liquids
- Wastewater disposal plans

4. Chesapeake Bay Executive Order 13508

Several natural resource objectives that stem from the issuance of this Order in May 2009 and the subsequent release of a Basin Protection and Restoration Strategy in May 2010 will contribute to sediment and nutrient reduction in New York. These principally include land conservation, brook trout and black duck habitat restoration and wetland restoration objectives. New York State looks forward to learning of the details of how various federal agencies will be supporting the attainment of these basin goals in New York.

The United States Forest Service and United States Fish and Wildlife Service are already working closely with New York in pursuit of these goals. USFWS held a kick off meeting with multiple local, state and other stakeholder in June 2010. The USFS is presently conducting work planning with DEC Division of Lands and Forests to effect a comprehensive forest conservation strategy for the Susquehanna/ Chemung region focused on maintaining and enhancing water quality. DEC also

expects to work closely with the United States Army Corps of Engineers and others to locate and develop watershed restoration project implementation opportunities.

5. Local Roads

Streams and roads are closely related in the upper Susquehanna region. It is generally hilly terrain with many roads and a long history of settlement along its valley streams. There are about 13,800 miles of streams and 17,000 miles of roadways

Stabilizing road ditches and banks is a local priority, not only to minimize stream pollution, but also to improve highway safety and reduce ditch maintenance. Changes in how water flows along and across roads also can reduce erosion and flooding problems. Stream road crossings frequently contribute to stream instability due to channel alterations and floodplain encroachments that may occur. Dredging and other maintenance activities intended to protect this infrastructure may also contribute to stream destabilization.

Several roadway practices are beneficial, including hydro-seeding, grade breaks (check dams), under-drains, French mattresses (allowing water under the road through course stone), crown reshaping, profile and cross slope modification, high-water bypass techniques and the use of different surface aggregates. In-stream design structures, such as cross vanes, also protect bridges and culverts. Wetlands and other buffers also can be specifically designed and constructed or restored to capture road ditch runoff to reduce energy, capture sediments and provide opportunity to denitrify atmospheric and automobile exhaust sources of nitrogen. Incorporating these concepts into planning, implementation and training efforts is essential.

The Cornell Local Roads Program LTAP Center (http://www.clrp.cornell.edu/) provides training, technical assistance, and information to municipal officials and employees responsible for the maintenance, construction, and management of local highways and bridges in New York State. It is one of 58 Centers established under the Local Technical Assistance Program (LTAP) of the Federal Highway Administration. Soil and Water Conservation Districts also provide technical assistance with road bank stabilization and erosion prevention associated with road systems.

6. The Waterbody Inventory/Priority Waterbody List

The DEC Division of Water (DOW) maintains an extensive inventory of the state's water resources. This inventory, the Waterbody Inventory/Priority Waterbodies List also provides summaries of general water quality conditions, tracks the degree to which the waterbodies support a range of uses and monitors progress toward the identification and resolution of water quality problems, pollutants and sources.

This PWL supplements the 303 (d) list and serves as an early warning system to protect good water quality and address problems before they reach the level of impairment of best usage of the waters. It serves as the basis for New York State Environmental Protection Fund funding programs such as Ag-nonpoint source. All of the Susquehanna and Chemung Basins (Chesapeake Bay watershed in New York) are listed as threatened for nutrient to make them eligible for funding improvements for Chesapeake Bay. This is despite the fact that only a few ponded waters are listed as impaired by phosphorus (none are impaired for nitrogen) on the 303 (d) list. Some streams are listed in the PWL as stressed or threatened, but not as impaired on 303(d) lists.

Susquehanna at http://www.dec.ny.gov/chemical/36734.html
Chemung at http://www.dec.ny.gov/chemical/36746.html

7. Susquehanna Comprehensive Wildlife Conservation Strategy (SCWCS)

President Bush signed the Department of the Interior and Related Agencies Appropriations Act, 2002, into law on November 5, 2001. This bill included $80 million for wildlife conservation grants to states. The Fish and Wildlife Service is apportioning funds to New York under the State Wildlife Grants portion of Public Law 107 63. New York's strategy is based on major watersheds. The SCWCS was developed by the DEC and other interested organizations and individuals, including the USC. It describes actions that will protect, support and enhance species of greatest conservation need. To the extent possible, goals of the SCWCS are integrated into the Tributary Strategy. The SCWCS can be viewed at http://www.dec.ny.gov/animals/30483.html

8. 2009 Open Space Conservation

The 2009 Open Space Conservation Plan (http://www.dec.ny.gov/lands/47990.html) takes a fresh approach to conserving our vital natural and recreational areas. Small or large areas; urban, suburban, rural or wilderness; can be protected with a combination of public land protection and thoughtful use of our own land. It incorporates the example of riparian areas; lands that line waterways, when protected and managed properly, can filter runoff, absorb stormwater and reduce catastrophic flooding downstream.

III. Account for Growth

According to US Census data compiled by the USEPA R3, from 1980 to 2008 the population in New York has decreased from 654,499 to 629,767. This essentially static population is not expected to change and is reflected in USEAP R3 estimates of the future number of septic systems.

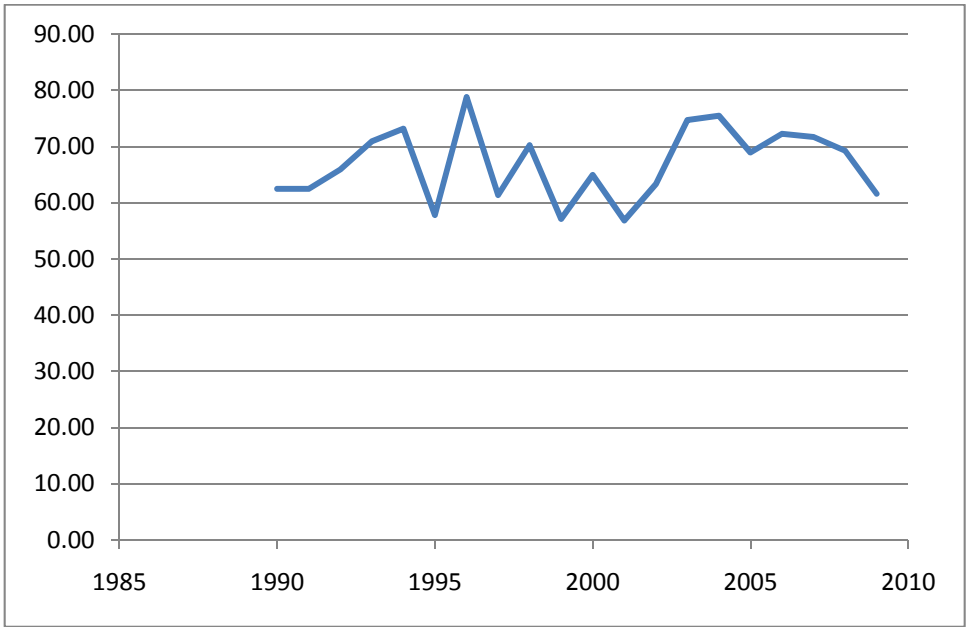
USEPA R3's county–based projections have not been relied on here. Because few counties in New York are wholly within the Chesapeake Bay watershed, and because of the more concentrated human and agricultural activities in the northern parts of the counties that are only partially in the Chesapeake Bay watershed, the county level data does not match, for example, the population USEPA R3 data amassed for just the New York watershed area.

Despite the lack of population growth construction/development activity does occur, but according to USEPA R3 watershed model and analysis there has been only 2000 acres of urban growth in past 25 years.

The effective application of New York's rigorous stormwater programs limit any resulting increases in nutrient and sediment discharges. MS4s will need to offset loads in excess of their final WLA and construction (if within MS4) also will need to offset.

New York continues to see changes in agricultural distribution. As in the trend nationally, larger farms continue to increase animal numbers while small farms are going out of business. The expansion of small farms is addressed by the NY CAFO program for both medium and large CAFO farms.

Wastewater offsetting is explained in Section II. The history of Bay-significant wastewater discharge volume is shown in the chart below.



IV. Gap Analysis

Although not an expression of commitment to fill all "gap" areas, the following is a description of significant gaps areas.

Analysis of USEPA R3's various model runs of New York's four different scenarios of proposed realistic and aggressive watershed implementation program shows it is difficult for New York to achieve the allocations using only the watershed model and its credited practices. In addition, the fluctuating results have made it hard to use as the primary basis for planning. There are a number of areas where the model does include and/or does not fully account for fundamental conditions, practices and programs in New York. There are also future expected enhancements to programs and management practice standards that cannot be accounted for in the current watershed model.

It is important to note that New York has previously taken steps to correct large erroneous model assumptions. For instance, the model assumed a very high rate (200 pounds per acre) of nitrogen fertilization on hay land. New York provided the Bay program with a more accurate figure for New York of 80 pounds per acre. USEPA used this information to lower the 2009 baseline by approximately 400,000 pound of delivered nitrogen, as opposed to a credit applied toward New York achieving its allocations. New York would like assurance that USEPA will not "credit" other jurisdictions if other similar overestimates in the model are corrected, when there has been no change on the landscape and no resulting water quality response.

A. Model Recognition / Program Enhancements

Atmospheric Deposition

Much of the nitrogen load to the Bay is associated with atmospheric deposition from sources outside of New York.

In excess of 34% of the Bay's nitrogen loading is estimated to be from air deposition[42]. To successfully address the Bay's nitrogen-related water quality impairment, this suggests a need for a heightened focus on the Chesapeake "air-shed" – which is significantly different than the watershed.

Further, New York is concerned that USEPA R3 has not adequately factored into its assessment of load source and potential remedies significant sources of nitrogen emissions near the Bay, particularly emissions from enclosed, concentrated agricultural facilities and vehicle exhaust from areas of concentrated human development. With such sources having a high delivery due to their immediate proximity to the Bay, it is reasonable to expect aggressive pursuit of controlling these significant sources.

Up to a third of atmospheric nitrogen deposition may be attributable to ammonia volatilization from agricultural sources[43]. Although the agricultural management practices suggested herein target nutrient reductions from runoff, many act to also reduce ammonia volatilization and subsequent deposition. These include precision feed/forage management, improved nutrient balance, cover crops and barnyard runoff controls, such as more frequent scraping and flushing, with covered manure storage. When prioritizing the implementation of BMPs, the ability to limit ammonia losses from farms must also be considered. Because application of manure to individual farm fields can be limited by the phosphorus index, New York dairy farms have an economic incentive to limit ammonia emissions and preserve nitrogen content for crop needs. In addition, the EPA is reviewing the need to promulgate federal regulations controlling large, concentrated ammonia emissions.

DEC understands that USEPA R3 is using the 2020 Modeled Impacts Assessment from the Ozone National Ambient Air Quality Standards rulemaking in its formulation of air deposition impacts on the Bay. This assessment does not necessarily reflect many new programs developed or being developed by the States and USEPA. Early indications are that NOx reductions on the order of 70 % from 2007 levels throughout the Eastern US could be required and the Bay watershed model does not account for this reduction.

For example, substantial NOx reductions will be needed in order to meet the new ozone NAAQS. While this level of reductions may seem daunting, it will be incumbent upon the States to develop programs that demonstrate attainment by the statutory deadline. If States fail, EPA would be required to develop federal implementation plans to assure attainment. It, therefore, is not speculative to include steep NOx reductions in any future case scenario used to determine nitrogen budget allocations.

In addition, New York has implemented strict NOx controls on power plants and other large stationary through enforcement proceedings and regulatory updates, neither of which are accounted for in the 2020 modeled assessment. This assessment would, therefore, underestimate the future year NOx emission reductions which would translate into higher nitrogen deposition levels than expected.

These emissions reductions would need to be fed into the CMAQ model as inputs in order to determine the nitrogen deposition that translates to loading to the Bay.

[42] Executive Order 13508 202a report, September 2009
[43] Executive Order 13508 202a report, September 2009

EPA should consider the following before finalizing its nitrogen budgets.

1. The 202 Modeled Impact Assessment is for 2020 and does not evaluate what the world will look like in 2025. In that time frame existing programs, such as new motor vehicle standards and other non-road engine standards, will continue to yield benefits and need to be assessed.
2. The impact of the CAIR replacement rule (aka the Transport Rule.) EPA states in its proposed Transport Rule that it will be issuing a second Transport Rule to further reduce NOx emissions to address nonattainment of the 1997 ozone NAAQS and the presumably the reconsidered ozone NAAQS. (See further discussion on the reconsidered ozone NAAQS in #5 below.) This impact needs to be in the final analysis.
3. The impact of State rules promulgated since the 2020 Modeled Impacts Assessment. For example, NYS has adopted revisions to its NOx RACT programs for stationary combustion installations, Portland cement plants, glass manufacturing and asphalt production and best available retrofit technology (BART) requirements that will result in substantial reductions in NOx emissions. These reductions will be implemented by 2014 and need to be included in any final analysis.
4. EPA should consider the impact of its own rules that it has or is promulgating in any final analysis. For example, EPA is required to adopt NESHAPs for industrial, commercial and institutional boilers, Portland cement plants, etc. that will likely have associated NOx benefits. These emission reductions will be implemented again in the 2014 time frame (depending on EPA's ability to complete these tasks) and should be included in the final analysis.
5. The State and the federal government have entered into several consent decrees that will require further controls since the analysis was done and there is at least one court decision that will also result in NOx emissions decreases over the course of this decade. (See LaFarge, Duke/CINERGY, St. Gobain, Ohio Edison, Kentucky Utilities, etc.). EPA should include these emissions reductions in its analysis.
6. EPA is reconsidering its 2008 ozone NAAQS and has proposed to lower the current primary NAAQS from 0.075 ppm to somewhere in the range of 0.070 to 0.060 ppm. It is also proposing to set the secondary ozone NAAQS based on longer term exposure. Regardless of where EPA comes out on the reconsideration, States will be required to develop state implementation plans (SIPs) that include measures to significantly reduce NOx emissions in order to attain NAAQS prior to 2020.

   Early indications are that NOx reductions on the order of 70 % from 2007 levels throughout the Eastern US could be required for attainment and the Bay watershed model does not account this reduction. SIPs and the programs necessary to meet Clean Air Act requirements take on essentially 2 forms - one to address transport and one to address local nonattainment. The transport SIP (CAA section 110a2D) needs to contain provisions adequate to prohibit emissions that contribute significantly to nonattainment, or interfere with maintenance, in any other State. EPA has presumably developed the Transport Rule to address this provision. However, the August 2010 Transport Rule proposal will not include provisions adequate for the October 2010 ozone NAAQS reconsideration. (In fact, EPA has retrograded to the 1997 ozone NAAQS as the mark for the Transport Rule proposal. EPA has promised a subsequent rulemaking to meet the reconsidered NAAQS, however, a timing problem exists because the CAA requires the transport provisions be in place 3 years after the promulgation of the NAAQS (2104). EPA's own rulemaking process may not allow this provision to be met in the statutory time frame.)

The local attainment SIP for the reconsidered ozone NAAQS will need to be completed by mid-2015. It needs to contain the measures being done to address transport and all local measures being done to meet rate-of-progress requirements (3% per annum reductions) and bring the area into attainment. These would all need to be implemented by the attainment deadline (which is set by EPA according to CAA section 181 depending on the severity of the problem).

7. EPA is considering new national rules, including Tier 3 motor vehicle standards. EPA needs to consider these programs in its final analysis, as well.

It needs to be noted that the emission reductions of these individual actions and programs are not necessarily additive. Many sources could be covered by multiple programs. For example, a power plant might have a consent decree, NOx RACT and BART requirements and also be covered under the Transport Rules. It would need to comply with all of these requirements individually and collectively.

The USEPA R3 allocation process and their current effort to promulgate the TMDL do not utilize the most up-to-date atmospheric projections. The CBP has been planning to update deposition projections using the next generation of deposition models, CMAQ. The CBP model has accounted for some of the CAA projected improvement, but only at a more general scale. Modeling on refined spatial scale (12 vs. 36 km grid) and analysis by source sector and jurisdiction are underway, but these improved model results are not available.

Even though the Chesapeake Bay program/USEPA R3 atmospheric modeling currently underestimates the likely benefits of emission reductions on deposition of nitrogen, the watershed modeled impact of those reduced nitrogen depositional loads are substantial especially in the New York portion of the watershed[44], as shown in the Table below.

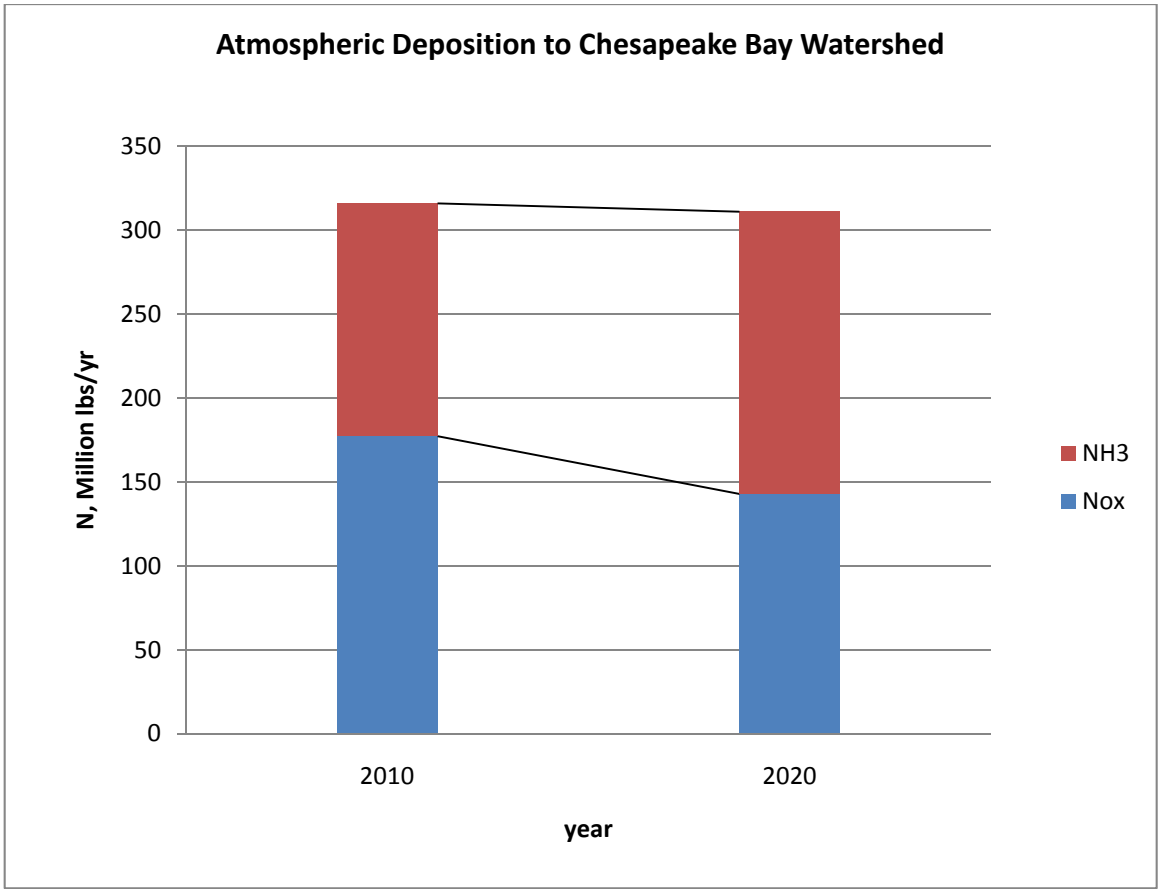
Other concerns with the current model:

- Although USEPA R3 Watershed model shows a substantial decrease in nontidal water deposition with atmospheric deposition controls in place, it shows no change to the nitrogen load from impervious surfaces. Because a main source of nitrogen on impervious surface is atmospheric deposition, it would be reasonable to expect a decrease in the exported loads from these surfaces. There is negligible opportunity for any biological processing of wet deposition that falls on hard surfaces which are directly piped to streams. The Chesapeake Bay watershed model estimates the combined delivered load from impervious surfaces in just two states, Virginia and Maryland to exceed 3 million lbs N/year, so any inaccuracies are not insignificant.
- The watershed model does not recognize the threshold of areal loading that forest have been shown to be able to process. Indication are that hotspots are developing near concentrated agriculture that would significantly affect the forest ability to process (denitrify) deposited nitrogen, and consequently, a majority of the excess deposition will now be transported to the Bay.

[44] Watershed model v5.3 (2009 baseline) shows a 1.4% delivered reduction bay watershed wide and a 3.7% delivered reduction in load from New York.

Agricultural emissions – nitrogen loads from nearshore agricultural ammonia

Ammonia depositional loads are increasing, such that they are projected to be greater than NOx deposition by 2020 and will offset any gains from NOx reductions (see graph below). These agricultural ammonia emissions (80% of the total ammonia depositional load) are largely attributed to concentrated agriculture such as on the eastern shore with its' high delivery and exchange factors. The projected Bay delivered load associated with deposition from agricultural emissions represents a larger allocation than NY, WV, DE and DC combined. EPA needs to fully address this major growing load to the Bay[45]



Agriculture

While New York believes that adjustments in the model are needed to bridge the gap, even well developed programs such as NY's AEM and CAFO programs could be further refined.

[45]Executive Order 13508 indicates that EPA may investigate ammonia emissions from agricultural sources within the Chesapeake Bay watershed.

- Comprehensive Nutrient Management Plans
  The watershed model reveals that a full suite of agricultural BMPs associated with the implementation of Comprehensive Nutrient Management Plans in New York yields only a 10% nitrogen reduction. This stems from an assumption in the model that there is an excess of manure. While this may be true in other areas of the Chesapeake watershed it is not true in New York. It may also stem from USEPA R3 overestimating the amount of purchased fertilizer in New York by basing such information on county-level data. This is significant because more fertilizer (different soil types, types of agriculture) is used in northern parts of many counties that are outside of the Chesapeake watershed.

- Conservation Reserve Enhancement Program
  The USDA/NRCS Conservation Reserve Enhancement Program is essential for the expansion of stream side buffers. At present its applicability is limited to certain geographic areas. Its applicability should extend throughout the Susquehanna/Chemung River Basin in New York. NYSDEC understands that USDA/NRCS must first conduct a study to justify expanding the geographic area of applicability. This study is stalled due to a lack of federal funding.

- Enhanced Nutrient Management
  USEPA R3 baseline assumption that land grant universities all recommend fertilizer application rates 35% above agronomic needs is not true in New York. This holds true for all crops, including non-legume hay, because the Cornell nutrient guidelines are based on applied research and are actively maintained through on-going field trials with the goal of nutrient use efficiency (no insurance factors are included in the guidelines).

- Prescribed Grazing
  The USEPA definition does not align with the suite of practices employed on such prescribed grazing sites in New York. The model needs to account for the nutrient and sediment reduction efficiencies for this practice as it is implemented in New York.

- Alfalfa
  In New York alfalfa, over the time it is grown, is not 100% covered it is mixed with grass.

- Stream Setbacks
  New York's CAFO permit requires stringent setbacks for nutrient applications in farmlands adjacent to New York's waters.

- Source Control and Precision Feed Management
  The watershed model needs to recognize the decreased feed/nutrient imports as part of the management practice when implemented in New York as it results in a net decrease in nutrients within the Chesapeake Bay watershed.

- Product Exports for Nutrient Balance
  The watershed model should be checked against watershed nutrient balancing, including accounting for crops (and milk and meat) exported out of the watershed as an additional nutrient reduction.

- Agricultural Waste Management Systems
  It is not clear how the watershed model accounts for the "system-based" planning required for CNMP development in New York. For example, a waste storage system or other production area management practice, when implemented without a complementary field management practice is inappropriate and should not be credited in the model.

Urban Runoff

- The comprehensive nature of the New York MS4 and construction stormwater programs are not adequately reflected in the watershed model, particularly as they related to behavior changes
- 2010 MS4 permit renewal:
  - USEPA Contractor could not arrive at a model scenario to capture all minimum control measures, including illicit discharge detection and elimination.
  - Prescriptive requirements for compliance with design manual, including rigorous green infrastructure requirements.
  - The New York MS4 permit requires evaluation of Green Infrastructure that is efficacious when municipal systems are reconstructed.

Road side conveyances

- Watershed model does not reflect the nutrient and sediment reduction associated with potential improvement of maintenance practices and design of road side ditches for use as bio-retention structures. The large network of rural roads makes roadside ditches an important pathway and innovative opportunity to abate stormwater runoff for both quality and quantity issues.

Forest

- With a substantial amount of New York forest cover being early successional forest, it is likely that USEPA R3 watershed model underestimates the rate of nitrogen uptake.

Floodplain Management

- Watershed model has no place to incorporate water quality benefits associated with various components of floodplain management, including non-structural flood control and limiting the storage of materials and siting of waste disposal is areas prone to flooding.

B. Generic Land use Changes

- Considering the stable if not downward population trend and overall economic conditions it is reasonable to expect that the downward trend in baseline nutrient loads shown from 1985 through 2010 will continue. With 2.44 mpy less delivered nitrogen achieved over this 25 year period, it is plausible for USEPA R3 to conclude that an additional 1.46 mpy less nitrogen may be achieved over the next 15 years. Conservatively, USEPA R3 could reasonably predict 0.5 mpy less nitrogen over this period. Likewise, with 0.08 mpy less delivered phosphors over the same 25 year period, it is plausible for USEPA R3 to conclude that an additional 0.048 mpy less phosphorus may be achieved over the next 15 years. Conservatively, USEPA R3, could reasonably predict 0.016 mpy less phosphorus over this period.

- If widespread Natural Gas extraction occurs in the Marcellus Shale in New York as is generally expected, associated land use changes could be significant. How this translates to overall nutrient and sediment loadings is a major unknown variable, and potentially will have a positive effect. Nonetheless, USEPA can reasonably expect that some, if not a high number, of large landowners,

will modify present land uses in response to income generated from natural gas. How much reduction this might yield is uncertain.

V. Commitment and Strategy to Fill Gaps

As noted throughout this document there are several areas where either the watershed model does not accurately reflect New York practices or where the model does not include particular programs or practices. A principal part of "gap closing" is to work with USEPA R3 to improve its model.

While NY believes the adjustments in model would bridge the gap, even well developed programs such as NYs could be further refined with additional resource.

Agriculture

DEC is currently working to implement enhanced technical requirements in New York including: evaluations of existing manure storage and transfers systems and vegetated treatment areas by Professional Engineers. New York State is also implementing (or considering) several practices that are believed to be better at reducing nutrient or sediment loads than the CBP defined practices and efficiencies.

- Better defined prescribed grazing (>60% cover) reflective of New York practice
- RUSLE II (should receive credit for additional benefit of implementation)
- Groundwater guidance revisions
- Enhanced P index standards using VSA hydrology[46], etc.
- Benchmarking/mass balancing
- Manure emissions controls
- AEM Tier 2 worksheets/ small scale retrofits (moving manure piles/clean water exclusions)

Variable Source Area hydrology

A cost effective and meaningful watershed approach also relies on a firm understanding of how each watershed functions in relation to its hydrological characteristics, drainage patterns, topography, land cover, land uses and misuses, precipitation events and other parameters. Targeting implementation sites using a "Variable Source Area" (VSA) hydrology concept may further increase success. Details of the VSA concept can be found at this Cornell University website:
http://soilandwater.bee.cornell.edu/Research/VSA/extension.html
This concept asserts that is that a relatively small portion of the watershed that influences a majority of runoff exiting a watershed. By implementing practices in these areas, substantial water quality improvements can be accomplished in a more cost effective manner.

Mass Balance for Agriculture

Source control relies on understanding a farm's nutrient budget. Mass balance analysis (difference between nutrients entering the farm through feed, fertilizer, fixation etc. and the amount leaving the farm through sales of milk, meat, animals, crops, manure etc.) can determine excess nutrients based on nutrient inputs and outputs. Mass balancing information is useful because it:

[46] Hydrologically Sensitive Areas: Variable Source Area Hydrology Implications for Water Quality Risk Assessment by M.Todd Walter, Michael F. Walter, Erin S. Brooks, Tammo S. Steenhuis, Jan Boll, Kirk Weiler

- Provides important baseline information for all planning and many implementation projects
- Prioritizes practices where excess nutrients are documented
- Has outreach potential by showing nutrient loading to farmers in a more understandable format
- Demonstrates economic and yield benefits that should attract greater farmer participation
- Can be used to develop a mass balance for a watershed
- Can be used as a tool for documentation if nutrient trading is initiated

The USC and Cornell University are conducting mass balances on 60 farms under a pilot project to streamline how to develop a more extensive application. Because this process is a precursor for precision feeding/forage management and an aid for targeting many management practices, it is a key planning tool.

CAFO

- Implement new CAFO permit requirements to help ensure that manure is applied in a manner consistent with plant uptake needs.
- Expand CAFO enforcement efforts to ensure compliance

Other

- Expand efforts to target conservation practices where they do the most good at a field-scale level

- Work with State and Federal partners to expand the use of the NYS Conservation Reserve Enhancement Program (NYS CREP). Presently resources are needed to conduct an environmental impact study to expand program eligibility.

    - CREP eligible watersheds are based on the DEC's 1996 Priority Waterbody List, which is out of date as each basin in the state is updated every 5 years on a rotational basis. Also the PWL reflects waterbodies impacts in New York. As such, the existence of a Chesapeake Bay TMDL does not meant the all the New York water body segments in the Susquehanna Basin CREP eligible. In fact less than half of the watersheds in the Susquehanna Basin show impacts on the 1996 list. The NYS CREP Steering Committee, which includes a representative from DEC Division of Water, have recommended that we amend the current CREP Agreement to use an AEM Tier 2 Environmental Assessment of each farm as a basis for determining CREP funding eligibility. For USDA FSA to even consider that proposed change we would need to fund the preparation of a Programmatic Environmental Assessment of the potential impact to the NYSCREP of making such a change in eligibility. FSA has estimated the cost of the environmental assessment that would be prepared by a contractor selected by FSA at between $45,000 and $50,000.

Specific USEPA WIP Questions

The Watershed Implementation Plan guidance from USEPA R3 dated April 2, 2010 includes the following specific questions about agriculture:

1. USEPA Question: How could the Bay jurisdiction address historical phosphorus accumulation in soils that will contribute future loads to the Bay?

For CAFOs and AFOs with CNMPs (or crop farms with CNMPs) - the New York P Index would not allow for further manure applications on fields with historical phosphorus accumulations. These types of conditions are most often found in fields in closest vicinity to the farm - making education an important component. For large farms the CAFO regulatory requirements require compliance with the P index - smaller farms rarely have the same land base restrictions and therefore, with proper education, can address this problem through the AEM program.

2. USEPA R3 Question: Is the Bay jurisdiction considering modifications to methods for determining appropriate agronomic rates for the application of manure, biosolids, and/or organic byproducts, including, for CAFOs, state technical standards developed in accordance with 40 CFR 123.36? When might a New York modification occur?

Answer: The New York CAFO Program is in compliance with 40 CFR 123.36 - and has been since 2004.

3. USEPA R3 Question: How could the Bay jurisdiction work with partners to improve coordination, communication, stakeholder engagement and/or availability of financial resources to facilitate nutrient and sediment reductions from agricultural lands in general and from manure management in particular? What are proposed or expected milestones, and when might they occur?

Answer: The Upper Susquehanna Coalition works through Soil and Water Conservation Districts to implement projects to conserve water quality within the basin, with each individual district working with citizens and agencies on a county level. Therefore New York already has the infrastructure in place to effectively provide local interaction, networking, outreach, and implementation to facilitate nutrient and sediment reductions on a watershed-wide level.

The USC has just completed a second 2-year implementation plan and has projected implementation with consistent levels of funding through 2025. Each SWCD also has an AEM strategy which is intended to move all farms through the AEM tiers. Therefore the SWCD and the USC continue to refine and update information on farm conservation needs.

At the inception of the New York CAFO program, DEC formed the CAFO work group – an active group of stakeholders tasked with developing an implementation strategy that achieved the environmental stewardship required through innovative solutions that work. This level of industry and environmental group involvement has been key to the success of the New York CAFO program. The CAFO work group will continue to work to understand the successes and failures of the current technical and regulatory framework and to make improvements at reissuance in 2014, 2019 and beyond.

4. USEPA R3 Question: If the Bay jurisdiction's NPDES regulations for CAFOs have not been revised to be consistent, at minimum, with the Federal regulations as of November 19, 2008 and are not anticipated to be approved by the applicable deadline, does the WIP include a schedule detailing the steps necessary to revise the regulations for EPA review and approval?

Answer: In New York State, the federal regulations described are included, by reference, in our State regulations (Part 750). DEC is in the process of a consensus amendment to meet this requirement.

5. USEPA R3 Question: Does the WIP demonstrate that the Bay jurisdiction's NPDES Compliance and Enforcement Program has adequate resources to conduct (1) compliance inspections of all permitted CAFOs, at least once every five years, (2) CAFO determination inspections of all unpermitted large CAFOs and all Medium AFOs at least one time [in the five years or by December 31, 2016], and (3) conduct on-site visits of AFOs for the purpose of evaluating criteria for designation. If these resources do not currently exist, when will they be available?

Answer: The current statewide target for CAFO compliance and enforcement inspections as part of the workplan with EPA R2 is an inspection of every large CAFO once other year and medium CAFOs once every five years. These targets are being met and exceeded in some watersheds of New York State – they are not, currently, being met in the Susquehanna / Chemung river basins. Additional staff resources are being sought as part of the Chesapeake Regulatory and accountability grant. Upon implementation of these resources, staff will be expected to substantially enhance the frequency of CAFO facility inspections.

6. USEPA R3 Question: If the Bay jurisdiction's WIP identifies new technologies for controlling or reducing nutrient and sediment loads from animal operations and row crop agriculture, provide proposed and expected milestones and dates for the following:
   When might these technologies go through the EPA-approved peer-review process described in Element 6?
   When might these technologies become available?
   What is their expected likelihood of adoption based on farmer interest, technical and/or financial assistance, capacity of federal or state program to promote adoption, and other considerations?
   What is a realistic timeframe for widespread adoption?

Answer: New York State is implementing (or considering) several practices that are believed to be better at reducing nutrient or sediment loads than the CBP defined practices and efficiencies

- Better defined prescribed grazing (>>60% cover) reflective of New York practice
- RUSLE II
- Groundwater guidance revisions
- Enhanced P index standards using VSA hydrology, etc.
- Benchmarking/mass balancing
- Manure emissions controls
- AEM Tier 2 worksheets/ small scale retrofits (moving manure piles/clean water exclusions)

Increasingly, New York dairy producers are conserving ammonia-nitrogen by spring incorporation of manure. When manure is incorporated in the spring, the ratio of N:P in most liquid dairy manure is reasonably well aligned with crop removal for both nitrogen and phosphorus, making for a sustainable nutrient balance. Aerator incorporation of manure is gaining and producers are considering various forms of injection as well, exploring technologies that are practical given constraints (including stony ground). While not all manure can be incorporated in a timely fashion for a variety of reasons, the data discussed in section 1 above clearly shows that New York State farms have worked hard to obtain and maintain a good land:manure balance.

Urban Runoff

- Evaluate potential MS4 Enhancements:
  - Address all municipal road ditch systems and appropriate hydrologic, sediment and nutrient control practices (not just for erosion control during construction/maintenance but long term use of ditches a bio-retention structures for nutrient reduction)
  - Consider information USEPA R3 contractor is developing regarding the cost and effectiveness of urban retrofit practices, including tree planting, riparian buffers, and green infrastructure, to provide guidance to municipalities regarding the implementation of practices that may meet the "maximum extent practicable" standard.
  - Consider information being developed by USEPA to bolster the detection and elimination of illicit connections.
- Regarding construction stormwater:
  - Consider application of Enhanced Phosphorus Design Guidance
  - Consider excluding stream setback area from General Permit coverage

- Work with USEPA R3to help ensure the comprehensive nature of the New York MS4 and construction stormwater programs are adequately reflected in the watershed model.

- Work to help ensure urban BMPS are documented and annually reported to CBP

- Work to better understand contribution from industrial stormwater

Road side conveyances

- Work with USEPA R3 to help ensure Watershed model reflects the nutrient and sediment reduction associated with potential improvement of maintenance practices and design of road side ditches for use as bio-retention structures. The large network of rural roads makes roadside ditches an important pathway and innovative opportunity to abate stormwater runoff for both quality and quantity issues.

- Although many do already, seek to expand hydro seeding and mulching capacity so that all County Soil and Water Conservation Districts have the capacity to assist local road maintenance.
  - Investigate need to develop management practice regarding disposal practices for soil excavated from roadside ditches.

Wastewater

- Work to identify innovative means of nutrient load reduction through re-use and natural treatment alternatives
- Among other things, the Chesapeake Regulatory and Accountability Grant work plan is expected to include a DEC point source regulatory oversight coordinating committee, with emphasis on wet weather operations and trucked in wastes, and an enhanced on-the-ground program, including rigorous schedules for inspections and enforcement activities.

Floodplain management

- Work with USEPA R3 to quantify water quality benefits associated with various floodplain management components
-

Atmospheric Deposition

CPB has indicated that states can get credit in their WIPs for any NOx emissions reduced beyond the 2020 CMAQ Scenario that result in reductions in delivered direct or indirect loads to the Bay including additional NOx reductions needed in the 2013 SIPS for the new ozone air quality standard.

From the Executive Order Strategy:

"EPA will significantly reduce nitrogen deposition to the Bay and watershed by 2020 by implementing programs to remedy air pollution under the Clean Air Act that will reduce nitrogen emissions from electric utilities, other industrial point sources, and on- and off-road vehicles, including ships. EPA will account for air deposition of nitrogen in the load allocations in the TMDL. By including air deposition in the TMDL load allocations, states will benefit from federally mandated emission reductions achieved by Bay states as well as those achieved by other states within the airshed. Furthermore, states may be adopting their own regulations to reduce nitrogen emissions to meet the national ambient air quality standards as part of the state implementation planning (SIP) process. *States will also be able to take credit for nitrogen emission reductions that go beyond federal emission control measures."*

As previously described, New York has already implemented emission controls or initiated emission controls that will be accomplished by 2020, even though USEPA R3 does not account for them in the atmospheric and watershed models, nor in the allocations. New York should receive credit. EPA has stated that States can get credit for any NOx emissions reduced beyond the 2020 CMAQ Scenario that result in reductions in delivered direct or indirect loads to the Bay including additional NOx reductions needed in the 2013 SIPS for the new ozone air quality standard.

Because EPA has not completed its refined analysis of atmospheric deposition, New York is faced with developing an estimate of the benefit of New York's actions. New York conservatively assumes a credit of 100,000 to 200,000 lbs N/year of delivered load.[47]

Improve Fed/State/local partnership and opportunity

For example, a coordinated effort form all levels of government will help ensure successful local government administration of existing local flood damage prevention laws (and Community Rating System enhancements) enacted for participation in the National flood Insurance Program and result in significant water quality benefits.

The New York State Department of Environmental Conservation is applying for an EPA Chesapeake Bay Regulatory and Accountability Program grant primarily for increased staff resources to accomplish these activities:

[47] Analysis was conducted using measured ammonia and NOx wet deposition in NY and considering some minor increases in ammonia deposition. The resulting estimate fell within the range that New York expects to be credited, above.

- Develop permits and ensure consistency with water quality needs, including TMDL waste load allocations
- Compliance monitoring, enforcement follow-up, reviews, reporting, inspections, investigations, audits, corrective actions and assistance visits
- TMDL watershed implementation plan development
- Improved tracking and accountability
- Improved dissemination of technical assistance and guidance

DEC expects these activities will contribute to the "Protect and Restore Water Quality" goals of the Chesapeake Bay Program, including reduced nutrient (and sediment where appropriate) from:

- Municipal and industrial wastewater facilities
- Agricultural lands and animal operations
- Developed lands
- Streamside/ riparian areas

Chesapeake Bay Regulatory and Accountability Grant

DEC is the agency responsible for compliance assurance, permit development and issuance, and TMDL development and TMDL implementation planning. Responsibilities rest with both regional field offices and the central office in Albany. DEC will be targeting actions at facilities/entities/activities within the Susquehanna and Chemung River Basins in New York which contribute nutrient and sediment to Chesapeake Bay.

In principal part, DEC will focus its work on the facilities/entities/activities it regulates, including wastewater treatment plants, concentrated animal feeding operations and municipal separate storm sewer systems. In addition, although not directly regulated, DEC will also augment its work, under contract with FEMA, to audit/assist local government administration of floodplain development regulations enacted for participation in the National Flood Insurance Program. All of this work will be located within the Susquehanna and Chemung River basins in New York and will emphasize nutrient and sediment reduction.

This will result in improved performance through enhanced oversight of facilities/activities/entities in the Susquehanna and Chemung River Basins regulated by DEC State Pollutant Discharge Elimination System permits. Such permits include wastewater discharges, concentrated animal feeding operations, municipal separate storm sewer systems and construction sites.

A primary objective of DEC Division of Water field staff is to ensure compliance with the terms and conditions of SPDES permits through data and plan review, site inspections, and a range of compliance assurance activities including technical assistance and formal enforcement actions. A primary objective under this grant is to conduct these activities with a targeted focus on the control of significant sources of nutrient and sediment.

VI. Tracking and Reporting Protocols

Through its work plan under CBP State Implementation Grant and through New York State Agricultural Environmental Management, the Upper Susquehanna Coalition has developed and implemented a model program to document and submit agricultural management practice implementation data. This is expected to continue.

The DEC collects data on a statewide basis from the Notices of Intent it receives from applicants seeking coverage under the states' general permits for construction stormwater, MS4s and CAFOs. The DEC also receives monthly Discharge Monitoring Reports from wastewater treatment facilities.

The CBRAP inspection/verification grant will assist DEC to compile this data at the watershed scale and to field verify management practice implementation data.

VII. Contingencies for Slow or Incomplete Implementation

For those implementation items that are part of any of DEC's permits, the DEC follows its enforcement guidance:

- Enforcement TOGS: 1.4.1 Integrated Compliance Strategy System
- June 1996 Edition, and 1.4.2 Compliance/Enforcement of SPDES Permits June 2010 Edition

DEC will use the adaptive management framework provided by the two milestones to help correct for slow or incomplete implementation.

While there are few federal facilities in this part of New York, no SPDES permits, it is reasonable to expect them to be models of innovation and aggressive in their pursuit nutrient and sediment load reductions.

VIII. Appendices

In order to understand the depth of what New York has developed, it is recommended that this Draft Phase I Watershed Implementation Plan be reviewed in its entirety, including the appendices. DEC staff is available to assist with this understanding.

1. Please refer to Table 5. It shows the detailed targets and schedules of this Draft Phase I Watershed Implementation.

2. Following is a table of the Draft Phase I WIP nonpoint source BMP implementation.

Ag BMPs	LU_Type	Model Run 5
Conservation-Tillage	HIGH	40%
Continuous No-Till	HIGH	1000 ac
Forest Buffers	AG	15,000 ac
Grass Buffers	AG	CROP/100%[48]
Wetland Restoration	AG	11,124 ac
Land Retirement	AG	8,692 ac
Tree Planting	AG	2,068 ac
Enhanced Nutrient Management	CROP	90%[49]
Enhanced Nutrient Management	HAY (grass)	90%[50]
Cover Crops (SDR)	ROW	20%
Conservation Plans	AG	82%
Stream Protection with Fencing (PastFence)	trp	100%[51]
Off-Stream Watering w/ No Fencing	PASTURE	1,000 ac
Off-Stream Watering w/ Fencing & Rot Grazing		
Stream Protection Fencing and Prescribed Grazing	PASTURE	80,000 ac[52]
Upland Prescribed Grazing	PASTURE	43,250 ac
Horse Pasture Management	PASTURE	2,000 ac
Animal Waste Management	Dairy AMUs	60%[53]
Barnyard Runoff Control Systems	Dairy AMUs	65%[54]
Precision Feeding Dairy	Dairy AMUs	50% (24%N, 25%P)[55]
Mortality Composters		50% dairy mort AMUs[56]
Forest Harvest BMPs		7,006 ac
Road Ditch Stabilization BMPs - DirtGravelnoDSA	Forest - iml	4,000 mi
Incorporation	CROP	36%
Incorporation	HAY (grass)	10%
Urban BMPs		
Street Sweeping		2,000,000 ft/month
Wet Ponds and Wetlands		5,500 ac
Dry Detention Ponds and Hydrodynamic Structures		3,700 ac
Dry Extended Detention Ponds		200 ac
Urban infiltration Practices with Sand, Vegetation		11,300 ac
Urban Filtering Practices		2,100 ac
Erosion and Sediment Control		17,900 ac
Urban Stream Restoration		26,500 ft
Non-Urban Stream Restoration		338,000 ft

[48] WIP 5 - Grass Buffers - 100% of available land after forest buffers applied (modeled as E3-type scenario)
[49] WIP 5 - ENMT - 90% of all dairy farm CROP land including 100% of CAFO
[50] WIP 5 - ENMT - 90% of all dairy farm non-legume HAY (grass) land including 100% of CAFO
[51] WIP 5 - 100% of the 100% PastFence is managed as grass buffer
[52] WIP 5 - SPF+PG - 10% of new systems are converting CROP, 25% of new systems are converting HAY
[53] WIP 5 - AWMS - 60% of all dairy farms including 100% of CAFO
[54] WIP 5 - BYRC - 65% of all dairy farms including 100% of CAFO
[55] WIP 5 - PFD - 50% of all dairy farms (24%N and 25%P reduction)
[56] WIP 5 - Mortality Comp - 50% of all dairy mortality will be composted

3. Following is Also appended is a list of BMPs and implementation levels, including definitions of agricultural practices produced by the Upper Susquehanna Coalition as they are applied in New York.

4. Also appended are copies of the following DEC documents

General Permits
Construction
Multi-Sector
MS4
CAFO (two permits)
Designation Criteria

Division of Water Guidance
Enforcement TOGS
Stormwater Inspection Manual
Stormwater Management Guidance for Local Officials
Pollution Prevention and Good Housekeeping Guidance-

Technical Standards
NYS Standards and Specification for Erosion and Sediment Control
NYS Stormwater Management Design Manual
NRCS Standards for New York
CAFO Technical Standards

A Nonpoint component to the New York CB WIP

Developed by the

Upper Susquehanna Coalition

Suggestions for Agricultural and Wetland
Best Management Practice Implementation to reduce Nutrients and Sediment Loads

2010

Nutrient Reduction for Agriculture

The USC developed levels of management practice implementation based on USC meetings with knowledgeable agricultural experts and farmers**, that are believed to be practical and reasonable considering available funding, technical staff, time and farm operator cooperation for implementation.** These practices include those that have been shown to be highly cost-effective in reducing nutrient runoff, such as comprehensive nutrient management plans, so they are clear choices to achieve significant nutrient reduction. Many of these practices also involve source control or stream protection, so they have local benefits and tend to be fiscally sustainable. In addition, many practices reduce the impacts of atmospheric nitrogen deposition by reducing ammonia emissions and/or providing nitrogen retention. Agricultural practices can also be very cost-effective because some involve operational changes without major capital commitments.

1. Precision Feeding and Forage Management. Nutrient management planning on dairy farms, with a focus on nutrient source reduction, is vital for farm economic sustainability and water quality improvement. Previous studies at Cornell University have reported that 60 to 80% of nitrogen and

phosphorus imported onto dairy farms remains after accounting for all nutrients that leave. Long term and sustainable nutrient reduction will only occur by reducing nutrient imbalances i.e., decreasing imports and/or increasing exports. Significant reductions in nutrient imports can be accomplished with changes in ration formulation, feeding management, forage production, and storage practices. This approach increases the efficiency of converting feed into milk. Doing so may decrease nutrient runoff while increasing farm income in the long term. In addition to reducing nutrient runoff, "Precision Feeding and Forage Management (PFFM)" also reduces volatilized ammonia, an important atmospheric pollutant.

In New York, PFFM is the continual process of providing adequate, not excess, nutrients to the animal and deriving a majority of nutrients from homegrown feeds through the integration of feeding and homegrown forage and grain management for the purpose of maintaining environmental and economic sustainability. PFFM is a continuous improvement process adopted and directed by the farm management with goals of improved nutrient efficiency, homegrown feed utilization and milk income overfeed costs. We achieve this by managing for the following key ration measures:

- Neutral Detergent Fiber intake as a percentage of body weight is greater than or equal to 0.9%
- Forage as a percentage of diet is greater than or equal to 60%
- Home grown feeds as a percentage of diet is greater than or equal to 60%
- Ration P as a percentage of requirement is less than or equal to 105%
- Diet crude protein is less than 16.5%
- Milk Urea Nitrogen (MUN) is 8-12 mg/dl

These measure correspond most directly to the ones that have been advanced by other groups defining PFFM (such as < 110% of NRC requirement for N and P), but note how New York State benchmarks go beyond the nutrient feeding levels to address homegrown feed as well, which opens up another area to affect mass nutrient balance.

New York State also has an animal health and management benchmark that provides a gauge on the efficacy (and efficiency) of management of dairy cattle during a critical stage of lactation. Health problems during this stage of lactation will compromise efficiency of nutrient management on the farm

as a result of loss of highly productive cows, milk sales, and increased replacement heifer demand (all of which will ultimately affect mass nutrient balance).

Preliminary research in the neighboring Delaware River Basin indicates that nitrogen and phosphorus intake can be reduced by 15 to 30% on dairy farms without affecting milk production. The USC estimates that nutrient excretion can be decreased by 8 to 25% and whole farm mass balance by 30 to 40% on many dairy farms in the Upper Susquehanna watershed through careful feed ration management and maximum use of home grown high quality forage. The PFFM's source reductions compliment other agricultural waste and stream corridor management practices, adding to their nutrient reduction potential.

PFFM requires long-term commitment to an intensive management style to achieve maximum benefits. Financial incentives to overcome the potential for net income loss may be necessary early on. It is imperative that sufficient technical field staff be available to support these specialized farm operations.

The estimate of PFFM practice implementation levels is preliminary, as the USC is just developing its program. The Delaware County Soil and Water Conservation District (SWCD) began a 5 farm pilot project in the Upper Susquehanna main stem and the USC and Cornell are initiating a USDA NRCS Conservation Innovation Grant PFFM pilot project on an additional 8 farms. This work will also help the CBP meet a priority goal: "to reduce surplus animal manure and poultry litter nutrients by adjusting animal diets." This goal is found in The Strategy for Managing Surplus Nutrients from Agricultural Animal Manure and Poultry Litter in the Chesapeake Bay Watershed- November 2005, a Chesapeake Bay Executive Council document endorsed by the USC and signed by the New York State Commissioner of Agriculture and Markets. This Manure Strategy calls for a 10% reduction in nitrogen and phosphorus in dairy manure by 2015. **This goal was used as a preliminary estimate for precision feed and forage management practice implementation, and based on the potential for a decrease of 30 to 40% in farm mass balances through PFFM, the USC estimates that PFFM would need to be implemented on 250 farms to reach that goal.**

According to the CBP, Dairy Precision Feeding reduces the quantity of P and N fed to livestock by formulating diets within 110% of Nutritional Research Council recommended level in order

to minimize the excretion of nutrients without negatively affecting milk production. Effectiveness estimates are determined via direct testing, however, without test results, TP reduction is assumed to be 25% and TN reductions are assumed to be 24% with no TSS associated with dairy precision feeding.

2. Comprehensive Nutrient Management Plans (CNMP). CNMPs optimize nutrient use to minimize nutrient loss while maintaining yield. These plans attempt to maximize use of on-farm nutrients such as manure and cover crops and minimize nutrient imports such as purchased fertilizer. Nutrient management BMPs are developed by certified planners in New York. Certified planners come from both the public and private sector. In order to sustain nutrient reductions, technical support for plan development, continued plan implementation and regular updates are necessary.

The estimate for New York is that comprehensive nutrient management planning could cover 90 percent of all cropland under the enhanced Nutrient Management definition (see 3 below). Component practices in CNMPs that receive additional reduction credits are listed separately in the following descriptions of individual practices.

3. Enhanced Nutrient Management (Yield Reserve). Based on the following definition of the Enhanced Nutrient Management practice by USEPA, enhanced Nutrient Management is the reduction in nitrogen applied to cropland beyond the nutrient management (NY_NRCS 590 standard) recommendation. The reduction percentage is currently defined at 15%. Based on research, the nutrient management rates of N application are set approximately 35% higher than what a crop needs to ensure nitrogen availability under optimal growing conditions. In a yield reserve program, the farmer would reduce the N application rate by 15%. Because farmers would be accepting some risk in yield loss, an incentive or crop insurance is used. We are assuming that NY has a greater land base to do 590 nutrient management compared to other states in the basin and that existing CAFO regulations in the USC portion of the basin in NY is regulated sufficiently to meet the federal standard. Therefore it is assumed that everyone following Cornell recommendations will be doing Enhanced Nutrient Management.

The reduction efficiencies for Enhanced Nutrient Management are 7% for TN and 0% for both TP and TSS. New York estimates that Enhanced Nutrient Management can be applied to 90% of both crop and hay land.

4. Conservation Plans: Field and Pasture Erosion Control Practices. Farm conservation plans are a combination of agronomic, management and engineered practices that protect and improve soil productivity and water quality, and prevent natural resource deterioration on a farm. Soil conservation plans are comprehensive plans that meet USDA-NRCS Field Office Technical Guide criteria. Soil conservation plans help control erosion by modifying operational or structural practices. Operational practices include crop rotations, tillage practices, or cover crops and may change from year to year. Structural practices are longer-term and include, but are not limited to, grass waterways in areas with concentrated flow, terraces, diversions, sediment basins and drop structures. Reduction efficiencies vary by land use and constituent of concern. Conservation plans addressing high till acreage receives a reduction of 8%, 15% and 25% for TN, TP, and TSS respectfully. Low till and hay acreage efficiencies are 3%, 5%, and 8%. Pasture acreage has a 5%, 10%, and 14% reduction for TN, TP, and TSS. **In New York, "Conservation Plans" are usually part of a CNMP. This helps to increase the Goal for conservation plans, estimated at 82% of all farm acreage.**

5. Animal waste management systems. These important practices are designed for proper handling, storage, and utilization of wastes generated from confined animal operations. They include a means of collecting, scraping or washing wastes and contaminated runoff from confinement areas into appropriately designed waste storage structures. Waste storage structures are typically made of concrete and require continued operation and maintenance, making them a significant cost item. Controlling runoff from roofs, feedlots and "loafing" areas are an integral part of these systems (See "6", Barnyard Runoff Control Systems, below). Scraping or flushing manure more frequently can reduce ammonia emissions from barns and animal confinement areas, as would manure transfer systems that separate feces from urine. Covered manure storage also emits less ammonia. Failure to properly collect and store generated manure may result in losses of liquid manure to surface water and excessive nutrient leachate to groundwater. For dry manure, contact with precipitation or wet soils under stockpiles can result in significant nutrient leaching. Bay Watershed Model reduction efficiencies for livestock animal waste systems are 100%, 100%, and 0% for nitrogen, phosphorus, and sediment, respectively. **When all CNMPs are fully implemented, an estimated 60% of the total of farms will need these complete systems, which will almost exclusively be on dairy operations.**

6. Barnyard runoff control practices and rotational loafing lots. These practices may be installed as part of a total animal waste management system or as a stand-alone practice, particularly on smaller

operations. Barnyard runoff control practices include diversions, rainwater gutters, and similar practices. The rotational loafing lot practice, by proximity, is grouped with barnyard control practices. Reduction efficiencies for barnyard runoff control and rotational loafing lot practices are 100%, 100%, and 0% for nitrogen, phosphorus, and sediment, respectively. **The Goal is to install approximately 65% of all farms, in addition to manure storage structures.**

7. Conservation Tillage. Conservation tillage involves planting and growing crops with minimal soil disturbance. Conservation tillage requires two components, (a) a minimum 30% residue coverage at the time of planting and (b) a non-inversion tillage method. No-till farming is a form of conservation tillage where the crop is seeded directly into vegetative cover or crop residue. Minimum tillage farming involves some disturbance of the soil, but uses tillage equipment and leaves much of the vegetation cover or crop residue on the surface. Because the climate in New York results in slower spring warm up of soils from continual cover, the ability to implement this practice is reduced. Incentives may be necessary to stimulate use of this practice. **Conservation Tillage gets credit in the model by changing the land use and reductions are given accordingly. The Goal is to implement conservation tillage on 40% of available land.**

8. Cereal Cover Crops. Cereal cover crops reduce erosion and nutrients leaching to groundwater or volatilizing by maintaining a vegetative cover on cropland and holding nutrients within the root zone. This practice involves planting and growing, but not harvesting, cereal crops with minimal soil disturbance. The crop is seeded directly into vegetative cover or crop residue and captures nitrogen in its tissue as it grows. When the cover crop is plowed down in spring, trapped nitrogen is released and used by the following crop. Two challenges associated with this practice include difficulty in establishing the crop because of early frost and difficulty in plowing under a heavy crop. Crops capable of nutrient removal include rye, wheat, barley, and to a much lesser extent, oats.

The Bay Watershed Model has a complex method for calculating nutrient reduction efficiencies for cereal cover crops. The research-based estimates of cover crop efficiencies need to be adjusted to provide more realistic estimates of efficiencies for widespread adoption of this practice. Effectiveness estimates vary between species, planting dates, and seeding techniques. To be eligible for level 1 reduction credit, referred to as early planting, the cover crop must be planted earlier than 14 days prior to the long-term published average date of the first killing frost in the fall. To be eligible for level 2

reduction credit, called standard planting, the cover crop must be planted 14 days prior to the average frost date up to the published long-term average date of the first killing frost in the fall. The Bay Watershed Model has no reduction efficiency for legume cover crops such as clover and vetch that fix their own nitrogen from the atmosphere.

Where total nitrogen is concerned, baseline efficiencies were developed for a particular cereal cover crop and then effectiveness estimates were assigned. The baseline calculation for drilled rye uses the baseline and multiples it by the subsurface flow proportion for the location and 0.75 to account for operational effectiveness. For the remaining rye calculations (other and aerial) and the drilled wheat and drilled barley calculations, the drilled rye baseline is multiplied against the individual species/corresponding seeding coefficient, and also multiplied by the subsurface flow proportion for the location and the scale coefficient. For each aerial or other wheat and barley calculation the base value is multiplied against the individual species/corresponding seeding coefficient, the seeding coefficient for the baseline species (drilled rye), the subsurface flow proportion for the location and also the scaling coefficient. See Table 1 for Total Nitrogen Efficiency Reductions.

The total phosphorous (TP) and total suspended sediment (TSS) reductions associated with cover crops are associated with surface flow and are recommended as a 15% and 20% reduction for TP and TSS, respectively for planting cereal cover crops on conventional tillage within 13 days after the first frost. See Table 1. **With the proper incentive, the Goal is to implement cereal cover crops on 20% of cropland.**

9. Commodity Cover Crops. Commodity cover crops differ from cereal cover crops because they may be harvested for grain, hay or silage and they may receive nutrient applications, but only after March 1 of the spring following their establishment. The intent of this practice is to modify normal small grain production practices by eliminating fall and winter fertilization so that crops function similarly to cover crops by scavenging available soil nitrogen for part of their cycle. This practice can encourage planting of more acreage of cereal grains by providing farmers with the flexibility of planting an inexpensive crop in the fall and delaying the decision to either kill or harvest the crop based on crop prices, silage needs or weather conditions.

Because fertilizer may be applied in the spring, the reduction efficiencies are reduced from cereal cover crop efficiencies. The same planting date criteria apply as specified under cereal cover crops. Refer to table 2 for reduction efficiencies.

Table 1. Total Nitrogen (TOTN), Phosphorus (TOTP), and Suspended Solids (TSED) efficiencies for various cereal cover crops on various land uses for three constituents of concern.

Cover Crop BMP	Land use Type	TOTN Efficiency	TOTP Efficiency	TSED Efficiency
Early Drilled Rye	High- Till	34%	15%	20%
Early Drilled Rye	Low-Till	34%	0%	0%
Early Other Wheat	High-Till	20%	15%	20%
Early Other Wheat	Low-Till	20%	0%	0%
Standard Other Wheat	High-Till	18%	7%	10%
Standard Other Wheat	Low-Till	18%	0%	0%

Table 2. Total Nitrogen (TOTN), Phosphorus (TOTP), and Suspended Solids (TSED) efficiencies for various commodity cover crops on various land uses for three constituents of concern.

Cover Crop BMP	Land use Type	TOTN Efficiency	TOTP Efficiency	TSED Efficiency
Early Other Wheat	High- Till	8%	0%	0%
Early Other Wheat	Low-Till	11%	0%	0%
Standard Other Wheat	High-Till	6%	0%	0%
Standard Other Wheat	Low-Till	9%	0%	0%

With the proper incentive, the Goal is to implement cereal and commodity cover crops on a combined 20% of cropland acres.

10. Land Retirement. Agricultural land retirement takes marginal and highly erosive cropland out of production by establishing permanent vegetative cover such as shrubs, grasses and trees. Land retired and planted to trees is reported under the "Tree Planting" BMP. Wetland construction could also be considered a form of land retirement. USDA NRCS Programs such as CRP, CREP and WHIP provide incentives for retirement. Some agricultural land is also going out of production as farms cease to operate. All retired land will be documented. This is especially important because agricultural land, namely cropland, is one of the highest nutrient sources in the Bay Watershed Model and agricultural land use changes usually result in less nutrient runoff. **Total retirement of agricultural lands is estimated to be at 8,692 acres. Reduction credit is given as a land use change in the model.**

11. Wetland Restoration (Agriculture). Agricultural wetland restoration activities re-establish natural hydrologic conditions that existed prior to installing subsurface or surface drainage. Projects may restore, create or enhance a wetland. Restored wetlands may be any wetland type including forested, scrub-shrub or emergent marsh. **Preliminary results of work by Binghamton University researchers and others show that wetlands capturing high nutrient runoff from barnyards reduce nitrogen concentrations by at least 50%. Restored wetlands also provide high quality wildlife habitat. However, in the Bay Watershed Model, wetland restoration receives reduction efficiencies equivalent to reverting the area back to upland forest.**

The USC has an active wetland program that is described in more detail in the Wetland Chapter of this strategy. A total of 4,147 wetland acres have been restored since 1990, most of which were on agricultural lands. **The Goal is to create or restore an additional 11,124 acres of wetlands on agricultural lands, including projects funded under USDA Natural Resources Conservation Service's Wetlands Reserve Program.**

12. Tree Planting. The Tree Planting BMP or afforestation (converting agricultural land to forest) includes tree planting on agricultural lands, except those used to establish riparian forest buffers, which is a separate practice. The tree planting practice targets highly erodible lands and critical resource areas.

The Bay Watershed Model treats tree planting as a land use conversion from row crop, pasture or hayland to forest. The tree planting **practice may be sparingly used considering that the New York portion of the Bay watershed is about 70% forest. The Goal is to convert 2,068 agricultural acres to forest with the help of tree planting or preferably through natural succession on voluntarily abandoned agricultural lands.**

13. Prescribed Grazing. The *Prescribed Grazing* system objective is to manage forage availability by reducing the time livestock spend grazing on a paddock. Reducing grazing time improves the uniformity of manure and urine deposition over the pasture. The cattle's urine can be taken up by grass, thus lowering ammonia emissions. Grazing also helps to prevent soil erosion, reduce surface runoff and improve forage cover, while utilizing animal manures. Livestock overgrazing and direct access to surface water are also reduced. Specific practices include exterior and interior fencing, laneway development or improvement, pasture seeding or improvement, watering systems (well, pond, spring development), pipelines, water troughs, and brush management. Prescribed grazing brings added benefits because some of the grazing practices are associated with other practices, such as livestock exclusion from streams and riparian buffers. A major barrier to overcome with this practice is that switching to grazing can be a major change in operational style.

Grazing was first initiated in New York through the Grazing Lands Conservation Initiative (GLCI), established in 1991 to provide voluntary high quality technical assistance and awareness of the importance of grazing land resources on private grazing lands. GLCI is a coalition of individuals and organizations functioning at the local, state, regional and national levels. It includes livestock producer organizations, scientific and professional grazing resource organizations, conservation and environmental groups, and state and federal natural resource and agricultural agencies. USDA NRCS administers the program. In 1995 the "Graze NY" program was developed with the assistance of Congressmen James Walsh, Sherwood Boehlert and Maurice Hinchey. Eleven counties in New York were given the opportunity to provide technical assistance to interested livestock producers. These counties focus their efforts on informing producers about the benefits associated with prescribed grazing. Information is delivered to interested producers through pasture training workshops, informational farm tours, on-site farm visits and personal contacts with interested producers.

Additional grazing initiatives in New York are being supported through the SWCC Agricultural Non-point Source Abatement and Control Grants Program. One leader in this initiative is the Finger Lakes Resource Conservation & Development Council that supports work through several grants that cover the entire New York portion of the Bay watershed. Broome and Tompkins County SWCD's have also secured grants to support multiple county grazing projects. Twelve counties in the New York portion of the Bay watershed actively participate in one or more grazing initiatives.

The USC actively supports all such initiatives through its Grazing Initiative by tracking progress, providing additional staff support and securing additional funding to maximize implementation efforts.

Because of its multiple potential benefits, cost-effectiveness and sustainability, Prescribed Grazing is an important practice to support and promote.

Presently the Bay Watershed Model does not have nutrient or sediment reduction efficiencies for this practice as it is implemented in New York. Until reduction efficiencies are established for this practice, which could be substantial, the Goal, with the right incentives, is to implement prescribed grazing or stream fencing with off-stream watering (see 14a below) on 80,000 pasture acres. For cost analysis and modeling purposes, the USC selected 123,250 of pasture acres to be in prescribed grazing.

14. Stream Protection in Pastures. Direct contact of pastured livestock with surface water results in manure deposition, streambank erosion, re-suspension of streambed sediments and nutrients, and aquatic habitat degradation. Stream access also affects herd health by exposure to water borne pathogens and risk of hoof problems. Two practices in the Watershed Model are relevant in New York: (a) off stream watering with stream fencing and (b) off stream watering without stream fencing. The practices are mutually exclusive, so reduction efficiencies are not additive.

(a) Off-Stream Watering with Fencing – This practice incorporates fence installation that excludes livestock from narrow strips of land along streams and provides an alternative, clean drinking water source. Fenced areas may be planted with trees or grass, but are typically not wide enough to provide the complete nutrient reduction benefits of buffers. Stream fencing should substantially limit livestock access to streams, but can allow for hardened crossing areas to access additional pastures or for livestock watering.

The Bay Watershed Model estimates a nutrient reduction on three pasture acres for each 208 feet of stream fencing with reduction efficiencies of 10%, 15%, and 32% for nitrogen, phosphorus, and sediment, respectively. Preliminary results from studies in Delaware County show even higher nutrient reductions. By reducing constant stress on stream banks from hooves, cattle exclusion is also a very important practice for stabilizing stream banks. This practice is lumped with prescribed grazing (see 13 above) for a Goal of 100% of pasture acres.

(b) Off-Stream Watering without Fencing – This practice requires the use of alternative drinking water troughs or tanks away from streams. To be effective, this practice should also include shade away from streams for livestock. To be successful, the practice should show reduced

livestock manure deposition in and near streams and move heavy traffic areas surrounding water sources to more upland locations. **The Bay Watershed Model reduction efficiencies are 15%, 22%, and 30% for nitrogen, phosphorus, and sediment, respectively. This practice will be installed where fencing is not feasible or wanted. The Goal is to install about 1,000 effected acres.**

15. Buffers (Agriculture). Besides nutrient reduction value, buffers contribute to habitat improvement. Buffer designs based upon "variable source area" hydrology, which incorporate an analysis of field slopes, drainage patterns and concentrated points of entry at the streambank, are priority projects because they maximize water quality benefits. The SWCC Agricultural Non-point Source Abatement and Control Grants Program scoring system gives added priority to buffers.

(a) Agricultural Riparian Forest Buffers are linear wooded areas, usually accompanied by shrubs and other vegetation, that are adjacent to rivers, streams and shorelines. Forest buffers help filter nutrients, sediments and other pollutants from runoff as well as remove nutrients from groundwater. This practice meets some resistance by farmers because of the loss of cropland, added expense of tree planting, maintenance and potential to shade crops. A graded approach that transitions from trees at the water edge to shrubs near the crops provides maximum benefits while reducing farmer concerns of shading. The CBP recommends a buffer width for riparian forest buffers (agriculture) of 100 feet, yet a 35 feet minimum (NRCS criteria) width is required to obtain reduction in the Bay Watershed Model. For New York, this practice reduces nitrogen by 54%, phosphorus by 42%, and sediment by 56%. **The Goal is to install approximately 15,000 acres of forested buffers.**

(b) Agricultural Riparian Grass Buffers are linear strips of grass or other non-woody vegetation maintained between the edge of fields and streams or rivers that help filter nutrients and sediment and improve habitat. The recommended buffer width is the same as riparian forests buffers. This practice has tremendous potential and would be more widely used if it were eligible for CREP funding on more than just cropland and if the grass grown on the buffer could be cut and utilized. A "natural regeneration" buffer that could ultimately revert to forest also has tremendous potential. This practice is slightly less efficient for nitrogen reduction in the Bay Watershed Model than forested buffers, (38%). Phosphorus and sediment reductions are the same in grass buffers as they are for forest buffers. **The Goal is to install approximately 100% of available land after forest buffers are applied.**

16. Horse Pasture Management (This definition is pending CBP Approval). Horse pasture management includes maintaining a 50% pasture cover with managed species (desirable inherent) and managing high traffic areas. Maintaining a 50% cover will improve the pasture so erosion and nutrient loss is minimized. High traffic areas are concentration areas within the pasture where the grass is sparse or nonexistent. High traffic area management is utilized to reduce the highest load contributing areas associated with pasture lands. These are often feeding areas, such as hay deposits around fence lines. These areas are treated as sacrifice areas.

Horse pasture management excludes offstream watering with and without fencing. Instead these stream protection BMPs are credited as separate practices (See the 14a and 14b BMP description for details). Pasture management applies to all pasture lands, as not every pasture has a stream linked to it. The offstream watering BMPs may be implemented on pastures adjacent to waterways. Where pastures are in contact with a stream managing animal, contact to the stream is critical. The dominant source of nutrient and sediment loss from pasture lands is associated with animal contact with the stream.

Overstocking is also frequently the cause of many nutrient and sediment problems, when preparing horse pasture management plans they should include pasture management, heavy use area improvement, and management of stocking densities.

The horse pasture management practice may be an increasingly important practice as a number of smaller horse farms in the basin have began to appear on the landscape. **According to the Bay Model, the efficiencies for nitrogen, phosphorus and sediment are 0%, 20% and 40%, respectively. The Goal is to add 2,000 effective pasture acres.**

17. Mortality Composting. Composting provides an inexpensive alternative for disposal of all dead animals, butcher wastes and other biological residuals. In addition to water quality benefits, mortality composting benefits both human and animal health. The temperatures achieved during composting will kill or greatly reduce most pathogens, reduces the risk of disease transmission, prevent nuisances such as flies, vermin and scavenging animals, and combats odor resulting from the anaerobic breakdown of proteins. Properly composted material is environmentally safe and a valuable soil amendment for growing certain crops.

Mortality composters involve composting routine mortality in a designed, on-farm facility, with subsequent land application of the compost. This prevents the necessity to bury dead animals that could result in nutrient leachate, or rendering of dead animals for processing into animal feeds or incineration. Mortality composting can be, and is applied, to various species including poultry, swine and dairy calves.

The pollution reductions associated with mortality composting is calculated using a set of equations incorporating the average mortality weight, nitrogen and phosphorus composition, percent mortality, the number of animals each year, and an effectiveness estimate. Mortality is not consistent, it increases with animal weight. To account for this average mortality weight is within the 70th weight percentile. The average nutrient composition, percent mortality and number of animals each year is dependent on each animal type, although in New York it will primarily affect dairy farms. **The effectiveness estimate remains the same regardless of species with 40% reduction for N and a 10% reduction for P when compared to burial. Our Goal is to affect 50% of dairy mortalities.**