Executive Summary of Pennsylvania's Draft Chesapeake Bay Tributary Strategy

Background

With the signing of the Chesapeake 2000 Agreement, Pennsylvania made a commitment to help remove the Chesapeake Bay from the federal Clean Water Act's list of impaired waters by 2010. Our partners to this commitment include all the jurisdictions in the Chesapeake watershed, including Delaware, Maryland, New York, Virginia, West Virginia, and the District of Columbia. The U.S. Environmental Protection Agency (EPA) and Chesapeake Bay Commission are also key partners. Pennsylvania is critical to this effort as 50 percent of the fresh water to the Chesapeake Bay flows from the Susquehanna River.

To achieve this goal, the Chesapeake Bay Program partners developed new scientifically based water quality criteria for the Chesapeake Bay. This guidance will assist the Bay tidal water states to adopt revised water quality standards to address nutrient and sediment based pollution in the Chesapeake Bay. Next, new nutrient and sediment reduction goals were developed for each major tributary and jurisdiction to meet the revised water quality criteria. The new goals, agreed to in April 2003, replace the previous nutrient reduction goal established by the 1987 Chesapeake Bay Agreement. Following the adoption of the revised state water quality standards in 2005, the Bay Program partners will re-evaluate, and adjust if necessary, the nutrient and sediment goals.

The new Bay-wide annual nutrient loading goals are 175 million pounds of nitrogen, 12.8 million pounds of phosphorus and 4.15 million tons for sediment.

For Pennsylvania, yearly nitrogen, phosphorus and sediment discharges to the Bay must be reduced to no more than 71.9 million pounds, 2.46 million pounds and 0.995 million tons, respectively. This is the first time a sediment goal has been agreed to by the Bay Program partners. These goals are also cap goals. Once Pennsylvania reaches these goals, the nutrient and sediment loads must be maintained at these levels to sustain the improved water quality within Chesapeake Bay.

To reach the cap goals, Pennsylvania must reduce nitrogen and phosphorus loads by 48.2 million pounds and 1.98 million pounds, respectively per year and sediment loads by 0.25 million tons per year. As of 2002, it is estimated that sufficient best management practices have been implemented to reduce nitrogen loads to the Bay by 10.9 million pounds per year, phosphorus loads by 0.85 million pounds per year and sediment by 0.14 million tons per year.

Analysis of recent water quality monitoring data confirms that Pennsylvania's reductions are real and measurable in the watershed. The seven monitoring stations on the Susquehanna River all show decreasing trends in flow-adjusted concentrations for nitrogen flowing to the Chesapeake Bay. The Tributary Strategy provides a roadmap to restoring the Bay's water quality.

The new major tributary and jurisdiction cap loads were developed by the Chesapeake Bay Program partners based on a formula to ensure equity and fairness across the watershed. They are based on data from the Chesapeake Bay Program's monitoring and water quality model to determine the nutrient levels needed to restore or maintain dissolved oxygen levels in the Chesapeake Bay. Pennsylvania's major tributary basins are the Susquehanna and Potomac River basins. For planning purposes, the smaller basins that flow directly to the Chesapeake Bay (Gunpowder Falls River in southern York County, and the Elk and Northeast Creeks in southern Chester County) were integrated with the major basins. Pennsylvania agreed to separate nitrogen and phosphorus cap loads for the Susquehanna and Potomac Rivers basins.

What is the Tributary Strategy?

This tributary strategy is the fourth since the first Bay agreement was signed in 1987. The first 1988 strategy and subsequent 1995 strategy update addressed the nutrient and sediment reductions defined in the 1987 agreement. The initial two strategies planned through the year 2000. A third 2002 strategy presented progress towards the 2000 reductions goals defined in the 1987 agreement and also provided a projection of reductions anticipated through 2005.

Pennsylvania was successful in meeting the 2000 phosphorus goal but fell short of the 2000 nitrogen goal. With additional knowledge of the water quality conditions needed to restore the Bay and better tools to evaluate how to attain the goal, we now know that we need to do more. The nutrient and sediment reductions outlined in the Chesapeake 2000 agreement are those necessary to restore the water quality of both Chesapeake Bay and its tributaries.

The new strategy planning efforts take a "Bottom Up" approach, using the 13 DEP Watershed Teams within Pennsylvania's Chesapeake basin. For the first time, Pennsylvania has sub-allocated the nutrient and sediment cap loads to the Potomac and Susquehanna basins. Nonpoint source loads are further sub-allocated to smaller basins represented by the Watershed Teams.

The new strategy also allocates other Chesapeake 2000 Agreement goals to the Watershed Teams. These include habitat restoration goals, which are:

- Establishing 10,000 miles of new riparian forest buffers;
- Creating 4000 acres of new/restored wetlands;
- Developing watersheds plans for 9,644,000 acres of land within the watershed;
- Including a wetland preservation plan component within the above watershed plans covering 3,616,000 acres of land; and
- Establishing a new goal for fish passage for migratory fish.

Analysis of the nutrient sources within Pennsylvania's portion of the Chesapeake Bay Watershed indicates that about 89 percent of nitrogen loads originate from nonpoint sources and about 11 percent are discharged from point sources. Similarly, about 82 percent of the phosphorus originates from nonpoint sources and about 18 percent are discharges from point sources. Consequently, the major focus of Pennsylvania's tributary strategy is towards reductions in nonpoint source nutrient loads.

The strategy outlines management practices for both the Susquehanna and Potomac basins needed to achieve the necessary nutrient and sediment reductions. These practices encompass reductions from all sources including agriculture, urban, forestland, open land, and wastewater treatment plants. Nutrient reductions are also shown for septic systems and for air reductions associated with implementation of the Clean Air Act amendments. A summary of anticipated nutrient and sediment reductions are included in Table 1. The management practices are shown in Table 2.

The strategy will be dynamic in nature. The level of management practices shown in Table 2 may vary over time as the strategy is implemented. Existing practices may be improved and new, more effective and cost efficient practices may be developed which will replace existing practices shown in the current strategy.

Agriculture Strategy:

The agricultural strategy utilizes a complement of existing and newly developed BMPs to achieve significant nutrient and sediment reductions. These BMPs focus on nutrient management and an array of conservation practices to improve water quality while protecting the soil and natural resources. Working cooperatively with the agricultural community to achieve these reductions is an important part of Pennsylvania's overall strategy.

Based on the level of reported BMP implementation, it is estimated that agriculture reduced average yearly loads of nitrogen by 13.7 million pounds, phosphorus loads by 175,000 pounds and sediment loads by 142,000 tons between 1985 and 2002. After accounting for this level of BMP implementation, it is estimated that agriculture contributes about 49% of the nitrogen, 63% of the phosphorus and 72% of sediment delivered to the Bay from Pennsylvania.

With full implementation of the agricultural strategy, it is estimated that average year loads of nitrogen, phosphorus and sediment loads will decrease by an estimated 42.3 million pounds, 1.17 million pounds, and 595,000 tons, respectively

Examples of practices within the agriculture strategy include:

- 84% of farm acres have an implemented nutrient management plan. A portion will include precision agriculture and yield reserve based practices.
- 96% of the tilled land utilize no-till practices.
- 399,138 acres of pasture with implemented pasture management practices.
- 95% of the animal waste controlled through comprehensive animal waste management systems.
- 951,577 acres of cover crops.
- 2,385,876 acres of implemented conservation plans.
- 226,128 acres of horse pasture with implemented management plans.

Urban Strategy:

The urban strategy utilizes a combination of storm water management, septic system controls, and landuse management to reduce nutrient and sediment from urban areas.

Based on the level of reported BMP implementation, it is estimated that average yearly nitrogen, phosphorus and sediment loads from urban land were reduced by 0.56 million pounds, 50,000 pounds and 56 tons, respectively, between 1985 and 2002. After accounting for this level of BMP implementation it is estimated that urban land contributes about 7% of the nitrogen, 7% of the phosphorus and 5% of sediment delivered to the Bay from Pennsylvania. Additionally, septic system discharges are estimated to contribute about 4% of the nitrogen loads.
With full implementation of the urban strategy, it is estimated that nitrogen, phosphorus and sediment loads will decrease by an estimated 4.1 million pounds, 177,300 pounds and 37,600 tons, respectively.

Examples of practices within the urban strategy include:

- 752,421 acres of urban land with stormwater management practices;
- 17,715 acres of erosion and sediment controls associated with construction activities;
- 288,513 septic systems with denitrification controls or that are hooked up to existing treatment facilities;
- Development of a program to implement nutrient management on 442,410 acres of urban land receiving commercial or homeowner applications of fertilizer; and
- Development of a program to track the nutrient and sediment reductions associated with urban street sweeping.

Additional Nonpoint Source Strategies:

An important component of Pennsylvania's Strategy includes those practices that can be applied to a wide range of landuse. These practices are not particular to one sector or landuse within the watershed. For example, riparian forest buffers can be planted on agricultural land, urban land, recreation areas and open areas commonly referred to as mixed open land. The nutrient reductions associated with these practices, for the most part, are

included within the reductions listed for the Agricultural and Urban strategies.

Example of additional nonpoint source practices:

- 10,000 miles of riparian forest buffers
- 4,000 acres of new wetlands
- Over 5.3 million feet of improvements to dirt and gravel roads adjacent to streams
- 412,250 feet of stream restoration in non-urban areas
- 14,605 acres of abandoned mined land reclaimed
- Nutrient management planning on 1.25 million acres of recreational and other mixed open land

Air Reduction Strategy:

Pennsylvania's air reduction strategy is consistent with the federal Clean Air Act (CAA). Reductions in air emissions specified by the CAA will result in a reduction in nitrogen deposition within Pennsylvania, with subsequent improvements in water quality. With full implementation of the Clean Air Act it is estimated that nitrogen loads to the Bay from Pennsylvania will be reduced by about 3.7 million pounds per year.

Key components of the strategy include:

- Reduced air emission of nitrogen oxides (NOx) by implementing seasonal controls during the summer high ozone season
- Enhanced NOx emission standards for light duty vehicles
- Non-utility NOx source reductions by 2005
- Ammonia emission controls for 85% of the poultry, 50% of the swine and 25% of the dairy livestock.

Point Source Strategy:

Point source dischargers in Pennsylvania's portion of the Chesapeake Bay watershed will be challenged with reducing nutrient loads delivered to the Bay and with maintaining the load cap, given cost factors and increases in population growth. DEP will continue to be a leader and work with the point source community in identifying and implementing cost-effective approaches, such as nutrient trading and Quality of Life initiatives that effectively address nutrient reduction challenges while enabling new economic growth.

Currently Pennsylvania tracks 143 "significant" point source dischargers with flows equal to or greater than 0.4 million gallons per day (mgd). These facilities represent about 98% of Pennsylvania's point source flow and load. This criterion differs from the tidal states who track fewer plants and use a cutoff flow of 0.5 mgd because their facilities are generally larger than in Pennsylvania. Point sources also represent a much larger portion of these state's loads.

Point source discharges contributed about 11% of the total nitrogen and about 18% of the total phosphorus to the Chesapeake Bay from Pennsylvania waters based on 2002 estimates.

Full implementation of the point source strategy will achieve an estimated reduction of 3.1 million pounds of nitrogen and 745,000 pounds of phosphorus per year.

Key elements of the strategy include:

- Annual load limits in permits (i.e., load caps) will be established for all significant domestic dischargers. Limits will be based upon 2010 projected flows and a performance of 8 milligrams per liter (mg/l) for nitrogen and 1mg/l for phosphorus.
- Nutrient trading will be used to maintain the load caps in the face of population growth. Trading may also be used where economically wise to achieve individual facility load caps.
- Significant industrial waste (IW) dischargers will be expected to meet and maintain an aggregate cap load. It is anticipated that IWs will utilize nutrient trading as a means to help reach and maintain the aggregate load.

- Offsetting will be used to account for any new or expanded point source discharges that propose to exceed their 2010 design loads. This will be achieved by proper tracking and accounting of retired septic systems, use of trading options and an increased use of land application and reuse options for treated wastewater
- Monitoring of both point sources and receiving watersheds will be increased. Gradually, the voluntary program for point sources will be replaced with a permit requirement.
- The point source strategy will continue to use opportunistic approaches to financing to enhance the return on any invested monies. Incentives for this will come from various sources. The most important potential source of funding is the Governor's proposed bond issue to Enhance the Quality of Life.

Engaging the Public and Local Stakeholders:

Pennsylvania's 13 Watershed Teams located in the Chesapeake basin, with input from local governments and local stakeholders, will develop Tributary Strategies that rely on a "Bottom Up" approach. As a first step, the DEP Water Planning Office ~~will prepared~~prepared a draft strategy for each of the 13 Watershed Teams to address their allocated nutrient and sediment cap load. The Chesapeake Bay Program's Watershed Model is the basis for the draft strategy.

This Draft Executive Summary focuses only on the best management practices that will be necessary to meet Pennsylvania's goals. The real planning begins when the Watershed Teams engage local stakeholders to review the draft strategy and provide further development with input of local on-the-ground knowledge. Public meetings will be scheduled through the summer and fall to receive comment on the strategy and recommendations for new program initiatives to put it into action. A final strategy will be published in December.
This approach will identify pollution sources at the local level, and open up more responsible avenues for citizens and state/federal governments to address pollution sources. With local resident and government commitment, there is opportunity for more funding sources and management options to achieve reductions. Identifiable results beyond current state and federal programs will be quantified. Past Tributary Strategies focused almost exclusively on agricultural practices and upgrades to wastewater treatment plants. While these practices will remain key, the new strategies will look at a host of additional practices including urban stormwater management. Not only will this mean identifying new best management practices, but being able to track their reductions as well.

Many of the necessary actions to implement Tributary Strategies will need to be taken at the local level. These may include wastewater treatment plant upgrades, storm water management infrastructure, and better erosion and sediment control enforcement. The private sector must also participate through agricultural, forestry and industrial best management practices. These local actions can be captured in local watershed management plans. The average citizen also has a role to play in actions taken daily such as fertilizing the yard, conserving water and energy, maintaining septic systems or even relying more on public transportation.

Pennsylvania's Tributary Strategy will evolve as it is shaped by early successes and setbacks and by the availability of new technologies, ideas and resources. Sustained community participation will be pivotal to reach our goals in 2010 and beyond.

For information regarding Pennsylvania's Tributary Strategies and other Chesapeake Bay restoration initiatives visit the DEP website at www.dep.state.pa.us (Subject: Chesapeake Bay) or the EPA Chesapeake Bay website at www.chesapeakebay.net .

PA Department of Environmental Protection,
Water Planning Office, August 12, 2004

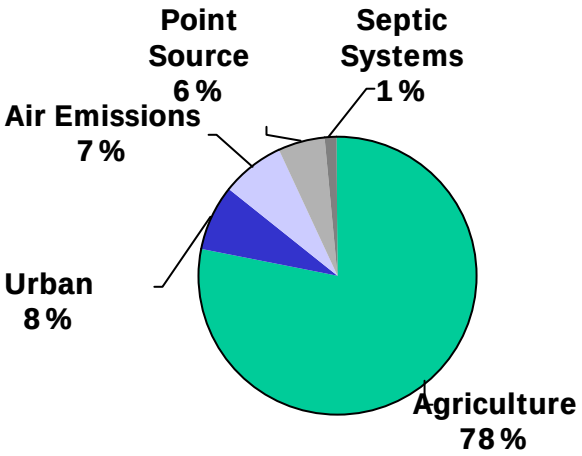
Table 1

Pennsylvania
Strategy Reduction Summary

	PA Chesapeake Bay Watershed		
	Nitrogen (mil lbs/yr)	**Phosphorus** (mil lbs/yr)	**Sediment** (mil tons/yr)
1985	120.14	4.44	1.24
2002	109.21	3.58	1.11
Strategy	69.66	2.43	0.65
Goal	71.90	2.46	0.99
Gap	-2.24	-0.03	-0.35

Strategy
Source of Nutrient Reductions
From 1985 Reference Year Loads

Nitrogen Reductions
50,479,000 lbs



Phosphorus Reductions
2,010,000 lbs

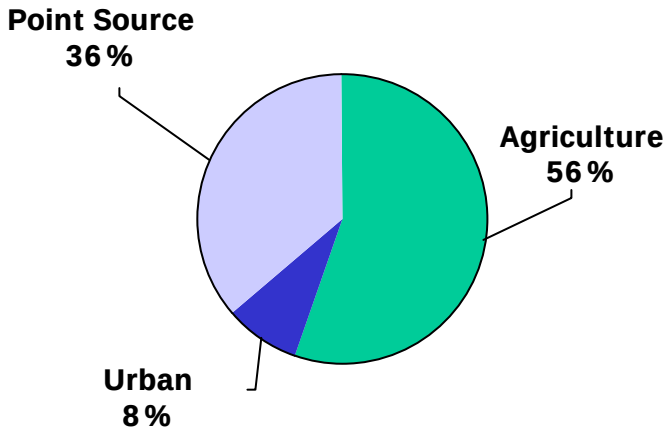


Table 2
Pennsylvania Tributary Strategy Best Management Practices

Landuse	Practice	Units	Strategy Implementation	Reported 2002 Implementation
AG	Conservation Tillage	Acre	1,052,763	607,048
AG	Carbon Sequestration (N)	Acre	288,442	T
AG	Grass Buffers	Acre	35,320	472
AG	Land Retirement	Acre	260,907	78,461
AG	Nutrient Management	Acre	403,246	1,165,899
AG	Yield Reserve (N)	Acre	401,966	0
AG	Precision Agriculture (N)	Acre	1,186,303	T
AG	Animal Waste Systems	AEU	805,330	537,225
AG	Mortality Composters (N)	System	36	T
AG	Farm Plans	Acre	2,385,876	1,207,005
AG	Horse Pasture (N)	Acre	226,128	T
AG	Advance No-Till (N)	Acre	480,592	T
AG	Cover Crops	Acre	951,577	T
AG	Rotational Grazing	Acre	32,333	11,996
AG	Precision Rotational Grazing (N)	Acre	47,197	0
AG	Off-Stream Watering w/o Fence	Acre	119,853	T
AG	Off-Stream Watering w/ Fence	Acre	199,755	14,101
AG	Precision Feeding for Dairy (N)	Percent	75%	T
AG	Phytase Feed Additive for Swine (N)	Percent	98%	0
AG	Ammonia Emission Reductions - Poultry (N)	Percent	85%	0
AG	Ammonia Emission Reductions - Swine (N)	Percent	50%	0
AG	Ammonia Emission Reductions - Dairy (N)	Percent	25%	0
AG	Phytase Feed Additive for Poultry	Percent	100%	100%
Developed	Urban Nutrient Management	Acre	442,410	0
Developed	Reduced Urban Growth (N)	Acre	7,118	0
Developed	Urban Street Sweeping (N)	Acre	29,957	T
Developed	SWM- Wet Ponds	Acre	250,891	T
Developed	SWM - Filtering	Acre	250,639	T
Developed	SWM Infiltration	Acre	250,891	T
Developed	SWM Stream Restoration (feet)	Acre	4,000	T
Developed	Erosion & Sediment Controls	Acre	17,715	19,349
Developed	Grass Buffers	Acre	43,715	0
Multiple	Riparian Forest Buffers	Acre	121,213	4,226
Multiple	Wetlands	Acre	4,000	1,069
Multiple	Tree Planting	Acre	29,171	26,577
Multiple	Non-Urban /Stream Restoration	Feet	412,250	2,130
Multiple	Dirt and Gravel Road Improve. (feet) (N)	Feet	5,340,858	T
Multiple	Forest Harvesting Practice	Acre	515	T
Multiple	Septic System Denitrification/Hookups	System	288,513	24,937
Other	Abandoned Mined Land Reclamation	Acre	14,605	7,486
Other	Mixed Open Nutrient Management	Acre	1,248,943	0

(N) - Indicates a new practice

T - Indicates that BMP is being implemented but tracking has not been developed.