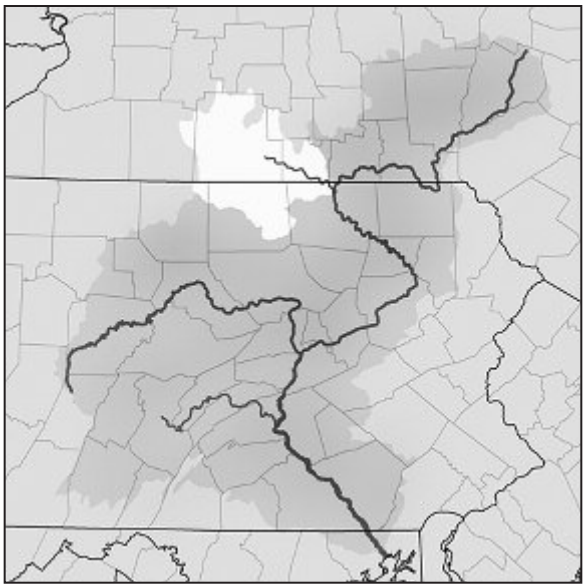
New York State Tributary Strategy for Chesapeake Bay Restoration

by Peter Freehafer



Karl Musser, wikipedia.com

Susquehanna River basin with Chemung River sub-basin highlighted

Chesapeake Bay is the largest estuary in the United States. It is about 200 miles long with more than 1,600 miles of shoreline in its many coves, wetlands and tidal tributaries. It provides habitat to more than 3,600 species of plants and animals and produces nearly 500 million pounds of seafood per year.

Much of the Bay is shallow, being less than six feet deep, which contributes to its biological productivity but adds to its sensitivity to pollution. It also has a very high ratio of watershed land area to water volume. The Bay watershed covers 64,000 square miles, more than 100,000 miles of creeks, streams and rivers, and includes more than 16 million people in portions of six states (Delaware, Maryland, New York, Pennsylvania, Virginia, and West Virginia) and the District of Columbia.

The New York portion of the Bay watershed consists of the Chemung and Susquehanna river basins and includes more than 6,250 square miles in 19 counties with a population of about 650,000 people. New York makes up about 10 percent of the total Bay watershed area and four percent of the total population.

Catalyst for Restoration

The Bay has been significantly degraded since at least 1980 from excess sediment and nutrients (nitrogen and phosphorus) entering its waters. Primary nutrient sources are sewage, cattle manure, inorganic fertilizer and atmospheric nitrogen deposition. Primary sediment sources are agriculture, stream bank erosion and construction.

In 1983, a voluntary government partnership, first championed by private citizens, formed to direct and manage Bay restoration efforts. That partnership, called the Chesapeake Bay Program (CBP), included Maryland, Virginia, Pennsylvania, the District of Columbia, the Chesapeake Bay Commission and the United States Environmental Protection Agency (EPA).

Although the CBP has made great efforts, continued Bay water quality impairments led the EPA and Bay states to list more than 90 percent of Bay tidal waters as impaired under the Federal Clean Water Act as a result of low dissolved oxygen and other problems related to nutrient and sediment pollution. In 2000, a federal court order required the development of a Chesapeake Bay Total Maximum Daily Load (TMDL) if Bay water quality impairments are not rectified by 2010. This spurred the CBP to reach out to the headwater states of New York, West Virginia and Delaware to more formally participate in the CBP.

New York's Entry

In 2000, New York Governor George Pataki signed a Memorandum of Understanding to agree to work with the EPA and other five tributary states and the District of Columbia to improve Chesapeake Bay water quality.

Monitoring data shows good water quality in New York and that nutrient and sediment levels are declining. This is largely due to a strong water stewardship ethic, an increasing amount of forest land cover, and effective water pollution control programs. However, to meet Bay restoration goals, a substantial amount of nutrient reduction from throughout the watershed is necessary.

Each state in the Chesapeake Bay watershed, including New York, has a phosphorus, nitrogen and sediment cap load allocation for its major tributary rivers[2] and has developed tributary strategies outlining how nutrient and sediment delivered to the Bay could be reduced in order to achieve its allocations. The New York Tributary Strategy (NYTS) can be found on the New York State Department of Environmental Conservation (NYSDEC) web page: http://www.dec.ny.gov/lands/33279.html. It describes a roadmap to gain reductions through both regulated activities, mostly in the wastewater source category, and voluntary and incentive-based nonpoint source activities, such as those related to agriculture.

These cap load allocations were derived from the total amount of these pollutants the Bay can annually receive and meet its water quality standards for dissolved oxygen and clarity, and other factors, such as the relative impact major tributaries have on Bay water quality. Because it enters at the top of the Bay and provides about half of its freshwater input, the Susquehanna River can have a strong influence on Bay water quality.

New York has one set of allocations for its portion of the Susquehanna River watershed. This includes both the Susquehanna and Chemung river basins in New York ***(Table 1)***.

Table 1. Chesapeake Bay Program Pollutant Loads

Pollutant	Chesapeake Bay Cap Load	New York Cap Load Allocation	New York Percentage of Total
Nitrogen (million pounds/year)	175	12.58	7%
Phosphorus (million pounds/year)	12.8	0.59	5%
Sediment (million tons/year)	4.15	0.131	3%

The CBP is conducting a re-evaluation of all cap load allocations in 2009, coincident with its completing more sophisticated evaluation tools, primarily computer models for watershed runoff, atmospheric deposition, Bay water quality, sediment transport and aquatic filter feeders. The outcome of the re-evaluation and a future total maximum daily load (TMDL) may dictate the need to revise the NYTS. In the interim, New York will use its present strategy as its planning tool to support projects that contribute to achieving its current goals.

To develop its strategy, the NYSDEC partnered with the Upper Susquehanna Coalition[3] (USC) to help provide local input and technical support. The NYSDEC also sought and received input from the 28 largest wastewater treatment facilities[4] in this region of New York.

Courtesy of USC

Upper Susquehanna Coalition members are presented a $700,000 check from the EPA given through a targeted watershed initiative grant.

To organize the plan, three work groups were formed: outreach, scientific support and strategy development. These groups were comprised of a wide range of stakeholders in the region, including citizens, academic institutions and state and county agencies. The resulting strategy offers a practical, cost-effective approach to reach its nutrient and sediment goals, if there is sufficient funding, staff and time necessary for implementation.

A first step was to examine the gap between current loads delivered to the Bay from New York and the cap load allocations. The NYSDEC, in consultation with the USC, then considered several factors to achieve an appropriate and reasonable balance of reduction from the following major source categories: agriculture, forest/other open space, wastewater, urban stormwater and septic systems. These factors include:

- 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 associated with reasonable responsibility for nutrient sources
- Resulting local water quality or natural resource benefits

Based upon the professional judgment of the NYSDEC and the USC, source category goals were then assigned, seeking the greatest amount of achievable, cost-effective reductions from each. Although the aforementioned cap load allocations are defined as delivered load – because load reductions can be more easily assessed at the point of origin – the NYTS goals are defined as loads generated in

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New York. Because of naturally occurring in-stream processes and the long distance to the Bay, about half of the nutrients generated in New York are delivered to the Bay. Since the Bay watershed model had predicted New York will be well under its sediment allocation, only nitrogen and phosphorus strategy goals were assigned. The following goals are presented in the New York Tributary Strategy ***(Table 2):***

Table 2. Susquehanna Nutrient Loads Leaving New York and New York Tributary Strategy Goals (units: million pounds/year)

Source Category	2006 Nitrogen Estimate	Nitrogen Discharge Goal	2006 Phosphorus Estimate	Phosphorus Discharge Goal
Agriculture	12.1	7.9	0.954	0.613
Forest/Other Open Space	12.6	10.3	0.283	0.155
Wastewater	3.7	2.3	0.476	0.234
Urban Stormwater	2.0	1.5	0.127	0.084
Septic System	1.3	1.2	0	0

Approaches to Source Reductions

The NYTS goes on to describe an approach to achieve reductions from each source category. In general, it first promotes controlling nutrients at its sources, then appropriately utilizing nutrients on the landscape and, finally, providing treatment controls at pipe's end or stream's edge. Because of the large amount of reduction that is technically and administratively achievable, agriculture and wastewater treatment are the highest overall priority for implementation.

For agriculture, New York's strategy focuses on dairies because they import the most nutrients and hold the most promise for cost-effective nutrient reduction. A wide spectrum of management practices is offered, from precision feeding (see article, page 50) and prescribed rotational grazing, to riparian buffers and wetlands. Implementation is guided by the New York Agriculture Environmental Management Program.[5] The USC estimates the cost of full implementation to be about $240 million.

For forest and other open space, emphasis is on the control of atmospheric deposition of nitrogen, largely from sources beyond New York. New York has already undertaken significant actions including the adoption of year-round nitrogen controls at power plants, low emission vehicle standards and the Regional Greenhouse Gas Initiative.

Courtesy of C&S Engineers

The new Binghamton-Johnson City Joint Sewage Treatment Plant handles 25 percent of the water/wastewater treatment flow into the Susquehanna River basin, the river seen flowing alongside the facility.

For wastewater, focus is on the 28 largest facilities. To achieve the strategy's phosphorus goal, virtually all of these facilities are expected to provide phosphorus removal treatment. To achieve the nitrogen goal, a smaller subset is expected to provide nitrogen removal treatment. Based on preliminary engineering assessments, the implementation cost estimate is $200 million. The Binghamton-Johnson City facility, which represents about 25 percent of the total flow, completed construction in 2008 to add a high degree of nitrogen removal treatment.

The wastewater strategy is divided into four levels, representing increased effort and understanding and potential changes to the regulatory framework, such as a Bay TMDL or new water quality nutrient standards in New York. The first step was to modify the permits in 2005 for additional nutrient monitoring. The second step, to modify the permits to include facility specific nutrient action levels and nutrient removal optimization, is occurring now. The action levels are based on the recent nutrient monitoring and document current nutrient removal performance. The nutrient removal optimization goals are to achieve effluent concentrations of 2 mg/L Total Phosphorus and 12 mg/L Total Nitrogen. These optimization efforts will foster innovation and help the NYSDEC establish a priority for potential major capital improvements, should additional funding become available. The last level is essentially a placeholder to institute waste load allocations, as needed, in a future TMDL for the Bay issued by the United States Environmental Protection Agency (EPA).

The urban stormwater and septic system categories are relatively minor sources in New York. The respective strategy goals are largely attainable through successful implementation of the New York State stormwater programs and standard septic tank pumping practices.

In large part, the New York Tributary Strategy relies on the continuation and enhancement of existing programs rather than the creation of new ones. It also recognizes that funding is needed for the significant level of actions suggested. To reduce costs, the NYTS promotes those items which are the most cost effective and reliable in the long term, improve water quality, reduce flooding and increase valuable habitat. These multiple local benefits will be the cornerstone of future strategy iterations.

Current good water quality in this region of New York reflects a strong local stewardship ethic and the results of effective water pollution control programs. Consequently, implementation of pollution reduction projects to reach NYTS goals also acts to protect such high quality water from degradation. The NYSDEC gratefully acknowledges the efforts and dedication of the many individuals that assisted in the preparation of the New York Tributary Strategy. By working together, its continuation will better conserve and protect the waters of New York and the Chesapeake Bay.

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References

1. Authorized in Clean Water Act Section 117, the Chesapeake Bay Program is a unique regional partnership that has led and directed the restoration of the Chesapeake Bay since 1983.