Chesapeake Bay Progress: Wastewater Pollution Reduction Leads the Way

Wastewater Treatment Plants Exceed Pollution Reduction Goals: Nitrogen Cut 57%, Phosphorus Cut 75% Since 1985

Impact of Bay TMDL

Upgrades and operational efficiencies at wastewater treatment plants (WWTPs) throughout the Chesapeake Bay watershed have resulted in steep reductions in nitrogen and phosphorus pollution and put the sector at the forefront of Bay restoration efforts. Since 1985, the wastewater sector has cumulatively prevented over 900 million pounds of nutrient pollution (nitrogen and phosphorus) from entering the Bay's tributaries—reducing nitrogen to the Bay by 57 percent and phosphorus by 75 percent. For the first time, annual progress in this sector effectively meets its 2025 nutrient pollution limits in the landmark Chesapeake Bay "pollution diet," or Bay Total Maximum Daily Load (Bay TMDL).

In partnership with the U.S. Environmental Protection Agency (EPA) and the seven Chesapeake Bay watershed jurisdictions, WWTP owners and operators have made these major gains despite increases in human population and wastewater volume.

Treatment plant upgrades – driven by advances in technology, enforceable Clean Water Act (CWA) National Pollutant Discharge Elimination System (NPDES) permits and funding from multiple local, state and federal sources – along with phosphorus detergent bans and operational reforms have produced local water quality improvements and widespread environmental and economic benefits. Many facilities are removing more nitrogen from wastewater than had been thought possible and are achieving reductions well below what their permits require. Moving forward, additional plants are scheduled to be upgraded and new treatment technologies and trades will be employed to help maintain the sector's progress in the face of continued growth in population.

Key Facts and Figures

- In 1985, wastewater represented 28 percent of total nitrogen loading to the Bay and 39 percent of the total phosphorus loading. In 2015, however, WWTPs represent a much smaller proportion of the total load, as indicated on the charts on Page 4 of this fact sheet.
- Over the last 30 years, treatment improvements at the 10 largest WWTPs in the Bay watershed have cumulatively prevented 240 million pounds of nitrogen and 48 million pounds of phosphorus from entering the Bay.
- Since the Bay TMDL was established in 2010, the wastewater sector cut nitrogen levels from 52 million pounds to 38 million pounds annually. This reduction far exceeds the 2017 interim pollution goal for the sector under the Bay TMDL, and at present, effectively meets the 2025 Bay TMDL target of 38 million pounds, according to Chesapeake Bay Program analysis (bit.ly/nutseddrop).

Keys to Progress

The 472 municipal and industrial WWTPs in the Chesapeake Bay watershed have been designated as significant sources by the states and EPA and have annual nutrient pollutant limits in their CWA NPDES permits, providing the public with legally enforceable assurance that pollutant reductions will be achieved. Many of the WWTPs in the Bay watershed have also been substantially upgraded. Continuing investments in advanced wastewater treatment have exceeded $7 billion in the Bay watershed. The investments were largely triggered by a 2004 Nutrient Permitting Approach that called for placing enforceable permit limits on pollution from wastewater treatment plants by EPA, the six Bay watershed states and the District of Columbia (bit.ly/NutrientApproach). The limits have since been reflected in the Bay TMDL (bit.ly/ChesBayTMDL) and accompanying state-led, locally driven Watershed Implementation Plans (WIP).

Municipal authorities have leveraged federal, state, and local resources helping to make the wastewater initiative the largest and most successful program in the nation at reducing nitrogen and phosphorus pollutant loads from WWTPs.

Wastewater treatment technological advances fueling these witnessed pollutant load reductions are due in large part to early research pioneered by the Chesapeake Bay Program's Scientific and Technical Advisory Committee in cooperation with academic organizations and the WWTP owners and operators on biological nutrient removal (BNR) and later enhanced nutrient removal (ENR). EPA continues to invest in new tools to help communities reduce energy use and optimize operations to promote additional nutrient removal at WWTPs.

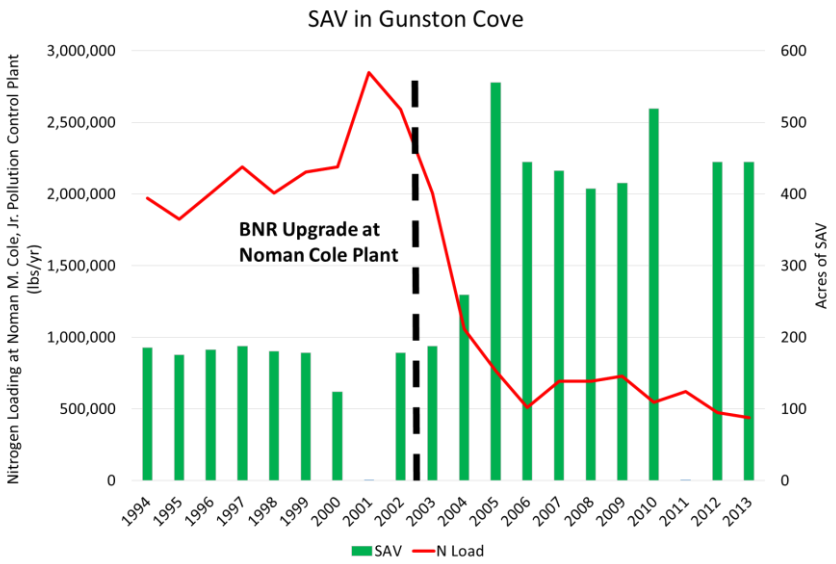
The wastewater sector success has been aided by state laws setting strict limits on the amount of phosphorus in consumer cleaning products, including laundry and dishwasher detergents. With about 18 million people living in the Chesapeake Bay watershed, these restrictions prevent Bay watershed homes from sending significant amounts of phosphate pollutants to their local WWTPs.

Local Waters and Communities Benefit from a Cleaner Bay

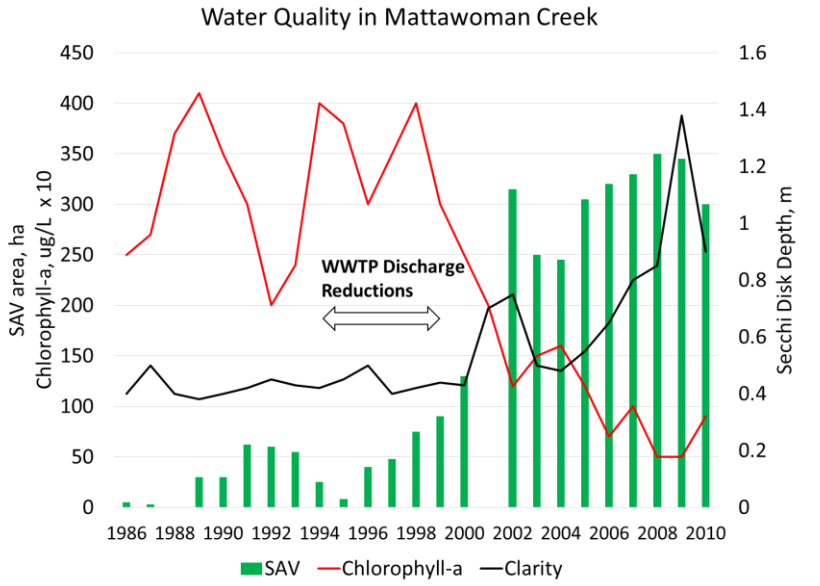
Upgrades to WWTPs are creating jobs while keeping human waste from entering our rivers and streams, removing the pollution that causes fish-killing algal blooms, and improving the overall quality of life throughout the Bay watershed.

Local streams, rivers, lakes, and the Chesapeake Bay are benefitting from the reductions in pollution made by WWTPs. In April 2016, the Chesapeake Bay Program reported the results of the winter dredge survey, finding 92 percent more adult female blue crabs than last winter (bit.ly/bluecrabs). Underwater grass abundance also increased by 21 percent between 2014 and 2015 to 91,000 acres, surpassing the 2017 restoration target two years ahead of schedule (bit.ly/BaySAV).

The charts on the right show a correlation between WWTP upgrades and improvements in submerged aquatic vegetation (SAV). These charts are derived from "Lessons from Chesapeake Bay Restoration Efforts: Understanding the role of nutrient reduction activities in improving water quality" (bit.ly/ChesBayInsights).



Wastewater treatment plant upgrades to BNR in the metropolitan Washington, D.C. area resulted in reductions in phosphorus and nitrogen concentrations. These nutrient reductions led to decreases in toxic cyanobacteria and helped submerged aquatic vegetation recover in the tidal Potomac River, such as those shown at Gunston Cove in Fairfax, Virginia. Note: 2001 and 2011 data not available. (bit.ly/ChesBayInsights)



Phosphorus loads decreased significantly in the Bay watershed following the early 1980s ban on phosphorus-based laundry detergents. Yet, water clarity improved, chlorophyll levels dropped, and Bay grasses really began to rebound after wastewater treatment plant effluent was reduced as shown by the case Mattawoman Creek, above. Note: SAV data not available for 1988 and 2001. (bit.ly/ChesBayInsights)

A Team Effort by Municipal Authorities, States, and EPA

Pennsylvania
Since 1985, Pennsylvania utilities have invested more than $1.4 billion in Bay restoration including state loan and grant programs that enabled upgrades at 190 WWTPs. The resulting impact is a reduction of more than 3 million pounds (28 percent) in nitrogen and over 1 million pounds (62 percent) in phosphorus from the wastewater sector.

Delaware
In Delaware, the Seaford Wastewater Treatment Plant and local industrial wastewater facility INVISTA integrated a nutrient trade agreement into their NPDES permits.

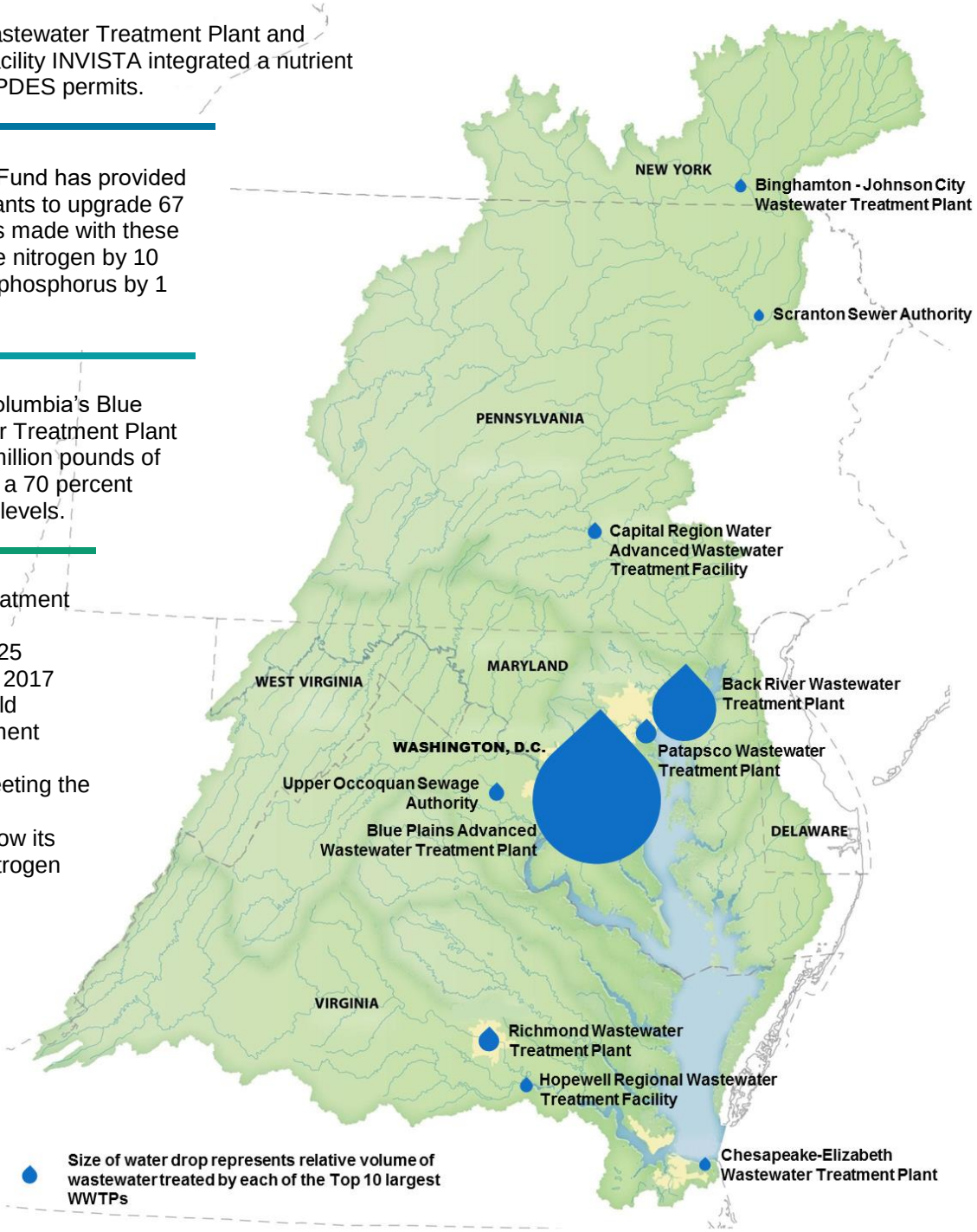
Maryland
Maryland's Bay Restoration Fund has provided more than $1.25 billion in grants to upgrade 67 wastewater plants. Upgrades made with these funds are expected to reduce nitrogen by 10 million pounds per year and phosphorus by 1 million pounds per year.

Washington, D.C.
Since 2011, the District of Columbia's Blue Plains Advanced Wastewater Treatment Plant has discharged less than 4 million pounds of nitrogen per year, more than a 70 percent decrease compared to 1990 levels.

West Virginia
All significant wastewater treatment facilities in West Virginia are expected to achieve their 2025 wasteload allocations by the 2017 deadline. The new Moorefield Regional Wastewater Treatment Plant, which went online in November 2013 is key to meeting the state's Chesapeake Bay commitments and is well below its discharge permit limits for nitrogen and phosphorus.

Virginia
With over $800 million in state funding, Virginia's Water Quality Improvement Fund has invested in 65 grants to wastewater facilities that are expected to reduce more than 21 million pounds of nitrogen and more than 4 million pounds of phosphorus.

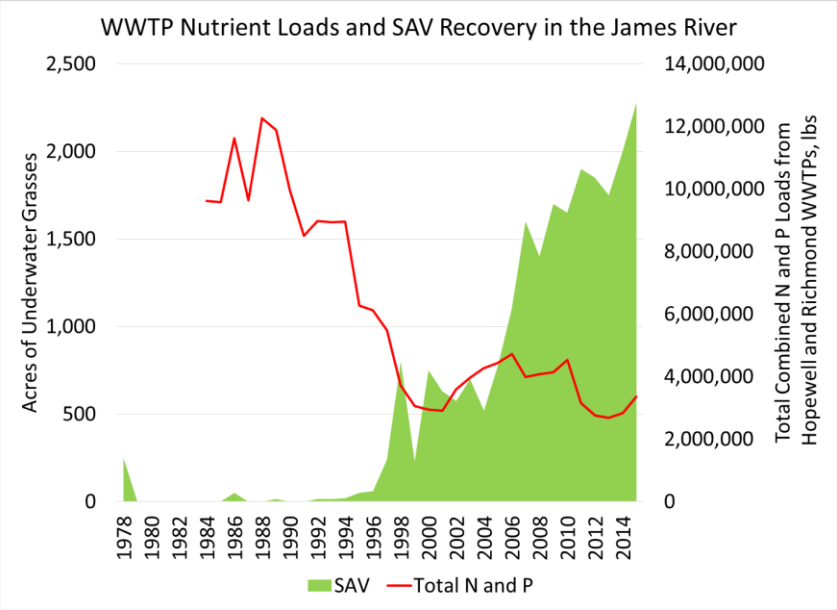
New York
New York has implemented an innovative "bubble" permit, where multiple dischargers are assigned an aggregate nitrogen limit in addition to their individual limits. Beginning with five significant treatment plants in 2015, the aggregate permit limits will enable trades and offsets between 29 facilities by 2017. The bubble permit currently includes 24 facilities.



Moving Forward

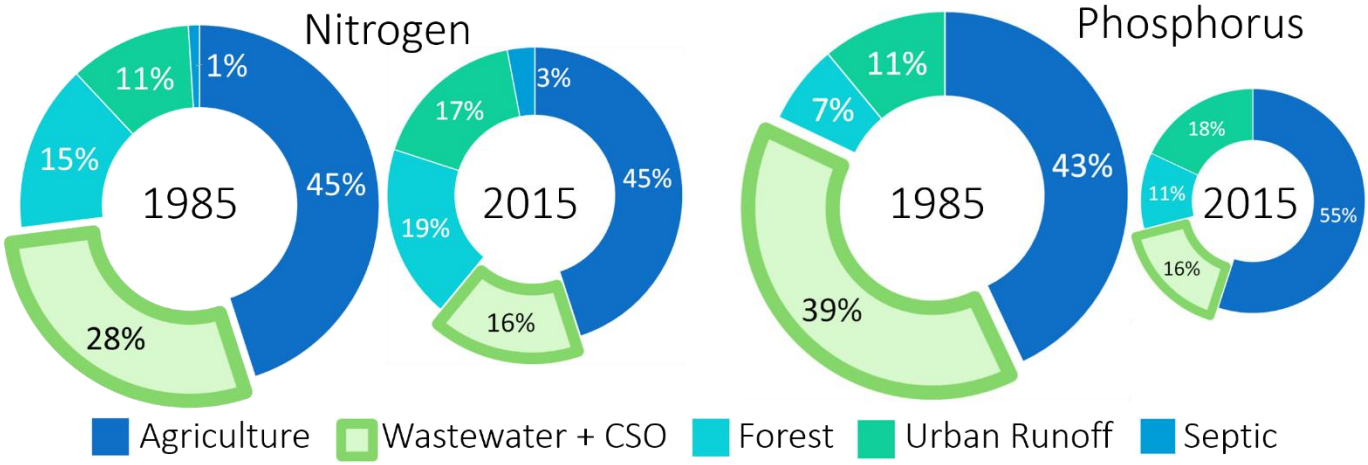
The wastewater sector reductions, made possible through significant publically-funded grant and loan programs, have been paramount to improving the health of the Chesapeake Bay. Investments in cutting-edge technology over the last three decades has led to improved water quality in many watersheds and river segments. Moving forward, the wastewater sector will need to ensure the maintenance of the nutrient pollutant limits in the face of population growth, climate change and other factors, using innovative water reuse, nutrient optimization and energy recovery technologies. The next step for WWTP owners and operators will be addressing pollution from other plants and considering trading programs that assist other pollutant source sectors in reducing nutrients, while still maintaining local water quality standards.

Leadership demonstrated by WWTP owners and operators in meeting the nutrient reduction challenge must be replicated by other pollutant source sectors (e.g. agriculture, urban stormwater, septic systems) in the watershed to ensure full attainment of Bay restoration goals. In the meantime, incremental progress is occurring in Bay and local water quality health.



Underwater grasses, an essential source of food and habitat for fish, crabs, and waterfowl, have substantially recovered in the James River. SAV growth is an excellent indicator of the health of the Bay as it responds to improvements in nutrient loadings, water clarity and sediment loading. Looking forward, there is still more work to do to ensure that the recovery continues and reaches the goal of 3,408 acres established within Virginia's water quality standards regulations. (bit.ly/StateofJames)

Chesapeake Bay Watershed Loads



For more information, visit the Chesapeake Bay Program at www.chesapeakebay.net/trackprogress or the U.S. EPA at www.epa.gov/chesapeake-bay-tmdl