



Chesapeake Bay Program
A Watershed Partnership

Progress toward Healthy Waters Part V: Measuring Change in the Waters of the Chesapeake Bay and its Watershed

The Chesapeake Bay Program (CBP) is developing a coordinated approach for measuring the success of our efforts to achieve healthy waters under the Chesapeake Bay Total Maximum Daily Load (TMDL). In addition to tracking water quality-related practices put in place on land, the Bay Program partners will be assessing our progress by examining upstream nitrogen, phosphorus and sediment trends over time as well as monitoring for specific water quality changes in the main Bay. This three-pronged approach will enable CBP partners to determine their progress toward meeting the 2012-13 milestone commitments.

Measuring the health of the Bay's headwater requires different scientific processes from those used in the main Bay. To monitor the health of rivers and streams in the Bay's vast watershed, the CBP's *non-tidal* monitoring network, in coordination with all the CBP partners and US Geological Survey (USGS), tracks changes over time, or "trends", in nutrients and sediment entering these local waters. In the Bay itself, our *tidal* monitoring network measures changes in four indicators: dissolved oxygen, chlorophyll *a*, water clarity and underwater grasses. This combined approach to monitoring water quality both upstream and in the Bay provide offer us a more accurate assessment of changes in our waters' health.

The Rivers & Streams of the Watershed: Trends Show Long-term Improvements

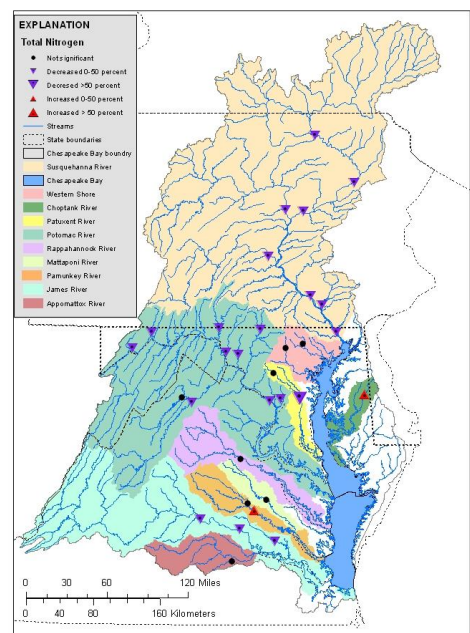
The long-term trends (1985-2010) of nitrogen and phosphorous concentrations entering local rivers and streams are improving at a majority of the sites in the Bay watershed. They indicate that pollution-reduction efforts, such as enhanced controls at wastewater treatment plants and practices to reduce nutrients and sediment from farms and suburban lands, are improving water-quality conditions in many areas of the watershed. However the most recent 10-year trends show less improvement overall and reinforce the need for nutrients, sediment and contaminants to be further reduced to achieve healthier waters in the Bay region. Some key results include:

Nitrogen Trends

- *Long term:* Since 1985, nitrogen concentrations have improved at about two-thirds of the monitoring stations. Two sites showed degrading conditions.
- *Short term:* Over the past 10 years, improvements were observed at just under half of the monitoring sites, while most sites had no significant change.

Phosphorus Trends

- *Long term:* Since 1985, phosphorus concentrations have improved at 70 percent of monitoring sites and worsened at 4 sites.
- *Short term:* Over the past 10 years, phosphorus concentrations improved at 1/3 of the sites, while most sites had no significant change.



Flow-adjusted trends for total nitrogen for 31 sites in the Chesapeake Bay Watershed, 1985-2010.

Sediment Trends

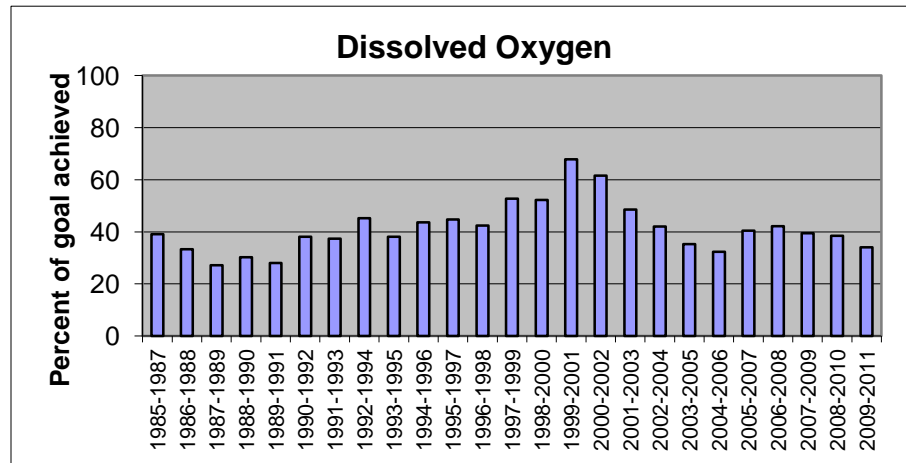
- *Long term:* Since 1985, sediment has decreased at about 30 percent of the sites. About 40 percent of the sites showed no significant change.
- *Short term:* Only 3 sites showed improvements, 9 sites showed degrading conditions with most sites showing no significant trends.

The Bay and Its Tidal Waters: Mixed Results So Far

In the Bay's tidal waters, the long-term progress toward meeting water quality standards for dissolved oxygen, chlorophyll *a*, water clarity and underwater grasses show mixed results. The lack of sustained water quality improvement in these areas was a key reason the TMDL was established in 2010. Recent updates for water quality indicate that:

Dissolved oxygen

- 34% of the tidal waters met DO standards for the 2009-2011 assessment period. This was a 4% decrease from the 2008-2010 assessment period.
- Since 1985, DO attainment has ranged from 27-68 %



Chlorophyll *a*.

- In 2011, 18 % of the tidal waters had chlorophyll *a* concentrations below certain threshold concentrations. This was a decrease of 4 % from 2010.
- Since 1985, the achievement of the concentrations below those threshold concentrations have ranged from 17-50 %. However, there has generally been a decreasing (degrading) trend since 1985

Water clarity/Underwater Grasses

- In 2011, 5 % of the tidal waters met the threshold for water clarity acceptable for Bay grasses. This is a 13 % decrease from 2010, where 18 % of the goal was achieved.
- Since 1985, the percent of the goal achieved has ranged from 5-41 % but in general the water is becoming more turbid (less clear) over time

For More Information

Visit "Track the Progress" on the Chesapeake Bay Program website (www.chesapeakebay.net) for details on both river health trends and Bay health indicators. Visit the USGS Chesapeake Bay website (www.chesapeake.usgs.gov) to find a new USGS report* that summarizes the CBP non-tidal network's data and watershed trends for nitrogen, phosphorus and sediment for two periods, 1985-2010 (long term) and 2001-2010 (the most recent 10 year period). The report is: *Langland, Blomquist, Moyer, and Hyer, 2012: Nutrient and Suspended-Sediment Trends, Loads, and Yields and Development of an Indicator of Stream-water Quality at Nontidal Sites in the Chesapeake Bay Watershed, 1985-2010, U.S. Geological Survey Scientific Investigations Report 2012-5093.*