Potomac River Quality In The Washington Region

DRAFT Summary

May 2014

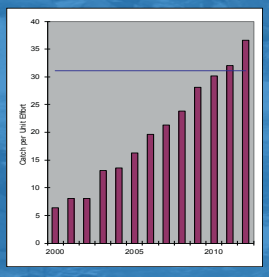
Progress, But More to Be Done

The assessment of water quality in the Potomac River shows that the Washington region's huge investments in improving wastewater treatment over the past thirty years have yielded significant improvements, especially in our portion of the Potomac River. Among the success stories: the amount of nitrogen and phosphorus discharged by wastewater plants in the metropolitan Washington region has declined dramatically since the 1980s and is on track for further reductions. As a result, the potential for harmful algal blooms in the upper Potomac estuary has declined significantly. And the populations of at least some of the plants and animals that live in this portion of the river, such as submerged aquatic vegetation and American shad, have rebounded.

But these improvements do not mean that either the river itself has fully recovered from the poor conditions of previous decades or that further efforts are unnecessary. In this, the river's situation mirrors that of the larger Chesapeake Bay watershed, of which it is an integral part.

SUCCESS STORIES

WWTP nutrient reductions



SAV + FISH

Increased Submerged Aquatic Vegetation, American Shad, Other Species

ALGAL BLOOMS

Decline in Severity

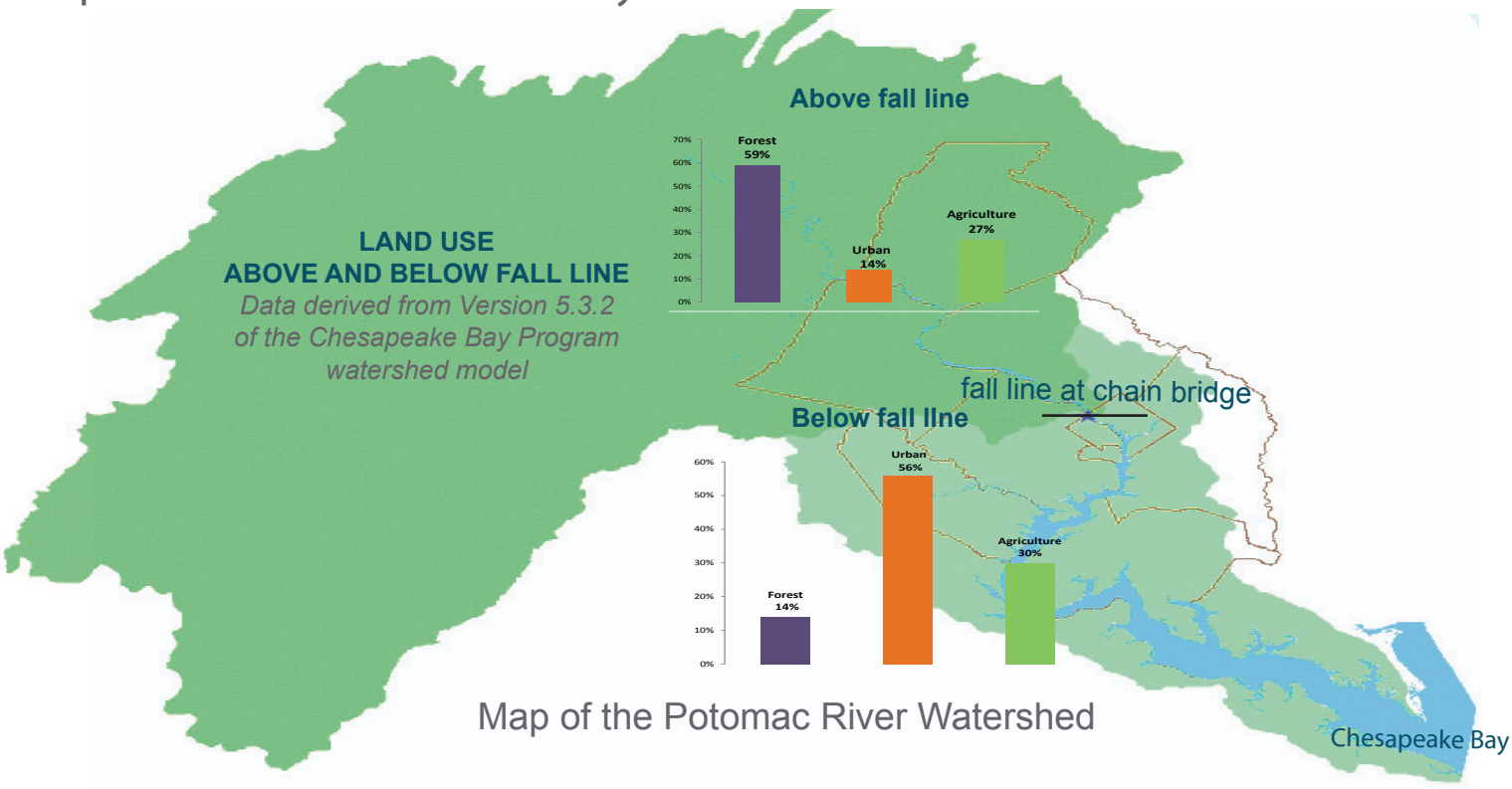
(photo from a 1983 bloom)

WATER QUALITY

Some places improving, others worsening

METROPOLITAN WASHINGTON
Council of Governments

Inputs to the Potomac Estuary



Map of the Potomac River Watershed

POTOMAC RIVER WATERSHED AT A GLANCE

Length:	383 miles from origins in West Virginia to confluence with the Chesapeake Bay
Area:	At 14,670 miles, the watershed comprises about 23 percent of the overall Bay watershed
Nature:	Free-flowing to the fall line at Chain Bridge; a tidally-influenced estuary for the rest of its length
Population:	About 6 million, 80 percent of whom live in COG region
Land use:	Primarily forested in the portion that drains above Chain Bridge; primarily urban in the portion that drains below Chain Bridge.

Determining how much pollution arises from the watershed's different land uses is key to understanding what management actions are necessary to further improve water quality.

In broad terms, water quality in the estuary, which stretches from the river's fall line at Chain Bridge in Washington, D.C., downriver to the mouth of Mattawoman Creek, is determined by three major inputs:

Potomac River at Chain Bridge

The quality of the water flowing across the fall line at Chain Bridge -
Through a contractor, COG monitors water quality at the Potomac River fall line at Chain Bridge. On an annual basis, the amount of nutrients and sediment varies in response to different precipitation patterns. The analysis of this data for trends is complicated and currently inconclusive, with some measures indicating that water quality is improving and others that it is deteriorating.

Stormwater Retention Pond

The quality of the water that drains to the river below Chain Bridge -
Because much of the land draining to the river below Chain Bridge is urbanized, the quality of stormwater runoff is a critical factor.

Blue Plains WWTP

Discharge from wastewater plants directly to the estuary -
Starting in the early 1980s and continuing through today, the area's wastewater treatment plants have made many upgrades to increase the efficiency with which they remove nutrients and other sources of pollution from their effluent. Reductions in wastewater nutrient loadings represent the greatest achievement in the 30-year history of the Chesapeake Bay restoration effort.

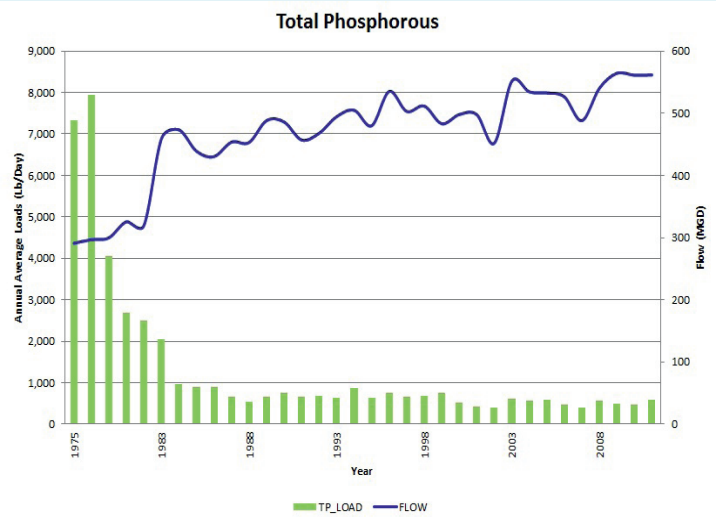
Regional Wastewater Treatment - An Unparalleled Success Story

Starting in the early 1960s and continuing through today, the area's wastewater treatment plants have made many upgrades to increase the efficiency with which they remove nutrients and other sources of pollution from their effluent.

Originally, ***phosphorus*** was the major nutrient concern because of its role in stimulating harmful levels of algal bloom in the freshwater portion of the Potomac estuary. Together with a ban on phosphates in detergents, phosphorus controls at area treatment plants have reduced the amount discharged by about 96 percent. Those controls still achieve limit-of-technology levels today.

Beginning in the 1990s, the plants began to focus on reducing discharges of ***nitrogen.*** The first round of such reduction efforts, known as biological nutrient removal, reduced wastewater loadings by about 44 percent from previous levels. More recently, the plants have begun to install another round of nitrogen removal technology, which will result in significant further reductions and achieve limit-of-technology standards for nitrogen.

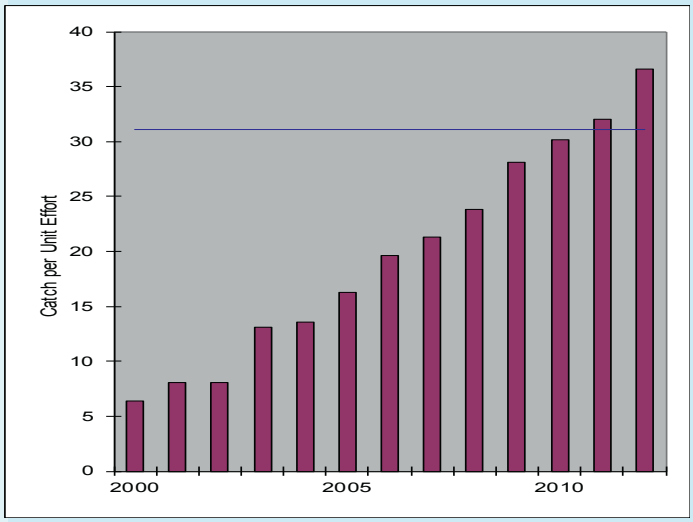
Amounts of Total Phosphorus Discharged by Wastewater Plants in the COG region



The reduction in nutrient discharges from wastewater treatment plants has been achieved despite increases in wastewater flow (blue line in the chart) to the plants as a result of population growth in the region.

Success Stories - More Submerged Aquatic Vegetation, More Fish and Fewer Algal Blooms

American Shad in Potomac



Shad populations in the Potomac River estimated by the Virginia Institute of Marine Sciences, as reported in the Maryland DNR's 2013 "Potomac Assessment." The size of the population is compared to a target for the Potomac set by the Chesapeake Bay Program.

Submerged Aquatic Vegetation (SAV)

The amount of SAV growing in the upper estuary fluctuates annually because of changes in weather conditions and other factors, but overall it has increased significantly in recent years as nutrient levels in the water have decreased.

Fish

The increase in SAV acres has been good news for other living resources -- such as anadramous fish species that live mostly in saltwater but spawn in freshwater -- that inhabit the upper Potomac estuary. One example is American shad, which has staged a major comeback in the Potomac in recent years.

Algal Blooms

Another success story has been the extent to which the explosive growth in algal populations in the estuary -- known as algal blooms -- has been kept in check in recent years. The blooms, which can lead to fish kills and harm human health, still occur when weather conditions are especially favorable, but the extent and severity of the blooms is much lower in recent years than in previous decades.

Conclusions and Next Steps

Water Quality Data - A Mixed Picture

The state of Maryland has the lead in monitoring water quality in the Potomac River estuary. The state's Department of Natural Resources gathers data on key parameters such as the level of dissolved oxygen as well as measuring the populations of some of the key plants and animals that live in the estuary. This water quality data gathered in the Potomac River estuary over the past 10-15 years paints a picture that defies a simple explanation. There are places in the river where current water quality conditions meet the habitat requirements for living resources, but the trends in these same conditions are worsening. There are other places where water quality conditions do not meet the habitat requirements, but the living resources trends are improving.

A Job Not Finished

From a management perspective, the assessment of water quality in the Potomac indicates that the initial efforts to improve water quality have succeeded to a point, but that reductions in the amount of pollutants in wastewater discharges are not, in themselves, sufficient to achieve water quality standards under the Clean Water Act nor to have the abundance of living resources we seek.

Declines in the amount of nutrients and sediment entering the estuary from upriver appear to have stalled and may in some cases be headed in the wrong direction. While some water quality indicators have improved in the upper part of the estuary, many of them, particularly water clarity and the amount of algal growth, still do not meet habitat requirements throughout the estuary as a whole. The level of dissolved oxygen, while currently sufficient to support aquatic life, appears to be in decline at some spots in the estuary.

The success of efforts to reduce nutrients and sediment that wash off urban or agricultural land with stormflow – or nutrients that enter the groundwater and gradually re-emerge into surface waters – is still uncertain. The Chain Bridge fall line data are difficult to interpret and may be complicated by significant lag times between when pollutants originally leave the land surface and when they show up in surface waters. What is certain is that additional effort to reduce these nonpoint sources will be needed to achieve the river's long-term water quality goals.

Future Fact Sheets

COG staff will explore aspects of water quality in the Potomac in more detail in additional and future updates to this fact sheet. This will include a more in-depth examination of water quality dynamics in the estuary, more detailed data on SAV and fall-line monitoring results, the status of emerging contaminants, the impact of climate change, and the connection between water quality in local streams and in the Potomac.

Region Forward Greater Washington 2050

As part of COG's Region Forward sustainability goal, a target has been set to achieve 100% of the Chesapeake Bay Program's Water Quality Implementation Goals by 2025. Visit www.mwcog.org for more information.

COG's Water Resources

The Department of Environmental Programs (DEP), Water Resources Program assists COG's local government members, and affiliated wastewater treatment and drinking water utilities, with protecting, restoring, and conserving the region's water resources as well as addressing the policy and technical implications of various state and federal initiatives that have water quality impacts. Visit our Web Site for additional information about our program and regional activities.

For additional information

For detailed information, additional charts and graphs please visit COG's website to download the Potomac River Water Quality in the Washington Region Fact Sheet:

http://www.mwcog.org/environment/water/downloads/Potomac%20WQ%20factsheet_January%202014.pdf.