potomac conservancy

TROUBLED WATERS
State of the Nation's River 2012

Four Decades After Clean Water Act, Potomac's Future Still Cloudy

The Potomac is a living river, and its flowing waters are exquisitely sensitive to events occurring throughout a vast, 14,700-square-mile basin. Indeed, some scientists think of the Potomac River as a kind of crystal ball: Take samples of its water into a laboratory and look carefully, and you can see how human activities have influenced the river's health in the past, are affecting its present water quality – and even what the future might bring.

Unfortunately, the crystal ball is offering a troubling picture of the Potomac these days. Although the federal Clean Water Act – celebrating its 40th anniversary this year – has helped improve water quality along some stretches of the 405-mile-long waterway, pollution continues to pose a serious threat. Too many stretches of the Potomac River are still too polluted to allow you to safely swim, boat, or fish, or to support healthy populations of fish and other aquatic life.

Some of these contaminants are obvious to the naked eye, such as choking sediments and floating trash. Others are invisible; it takes scientific tests to reveal pollutants such as harmful bacteria and nutrients, or toxic chemicals and metals. And some threats are just emerging into view: Only recently have researchers begun to track a growing number of exotic chemicals from drugs, cosmetics, and industrial processes that are leaking into the Potomac, which supplies drinking water to more than 5 million people.

That's the bad news. The good news is that we know more than ever before about the pollutants threatening our river – and what we need to do reduce the harm. Inside, we offer a brief introduction to the Potomac's pollution problems, and some solutions that cannot wait another 40 years.

Red flags. *Long stretches of the Potomac and its tributaries are still impaired by nutrients, pathogens, and other pollutants (red and yellow), leaving water unsafe for swimming and unhealthy for aquatic life. Source: EPA My Waters Mapper.*

Use It Or Lose It?
A Look At 'Designated Use'

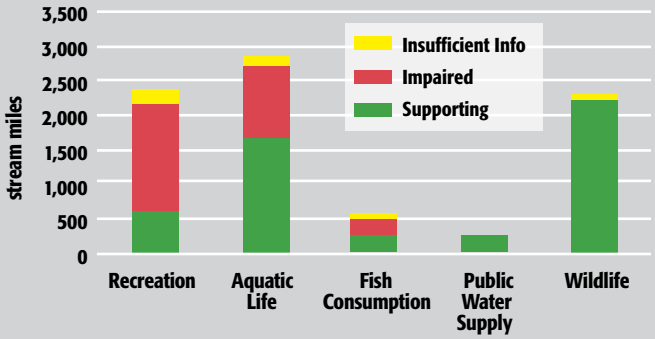
Most people have a general idea of what constitutes pollution: Something that changes clean water in a way that threatens human or ecological health. Legally speaking, however, the Clean Water Act takes a more formal approach. When Congress passed the law in 1972, it required every state to designate existing and potential "uses" for rivers, lakes and estuaries. States along the Potomac have determined that the river's designated uses include supporting recreation, aquatic life and wildlife, and providing water for drinking and fish for eating. Officials have also divided the river and its tributaries into numerous segments, each of which typically has a combination of designated uses.

The law asks officials to do what they must to attain — and then sustain — the water quality needed to support the highest designated use. That means identifying the specific pollutants or conditions that are causing impairment, and then working to make things better. So, if too much bacterial pollution from fecal matter is making a river unsafe for swimming, states should develop plans for improving septic and sewage treatment systems or preventing manure or poultry litter from being washed into streams (*for more on these plans, see "Cracking the WIPs," back page*). The big idea is to prevent people from settling for low-quality water that might be acceptable for some uses, such as watering crops, but not others, such as drinking. In fact, the law sets an admirable general goal of making every waterway "fishable" and "swimmable," two uses that require very high quality water.

Forty years on, the Clean Water Act has catalyzed dramatic water quality improvements across the nation. But major challenges remain. One problem is that states often do not have enough water quality data to tell them if a waterway is actually supporting its designated uses; nationwide, more than 70% of streams aren't assessed. Another is that data show that many waterways are still impaired for one or more designated uses. In Virginia's share of the upper Potomac basin, for example, officials reported this year that more than half of the 2,500 stream miles designated for recreation are rated as impaired due to bacterial pollution and other problems (*see chart on page 2*). Nearly a third of nearly 3,000 stream miles designated for aquatic life also failed, often because of high sediment loads. And about half of the 600 stream miles designated for "fish consumption" were too polluted with chemicals to produce fish that are safe to eat. Sadly, such worrying statistics demonstrate that we still have a long way to go to meet the Clean Water Act's mandate of clean, safe Potomac for all.

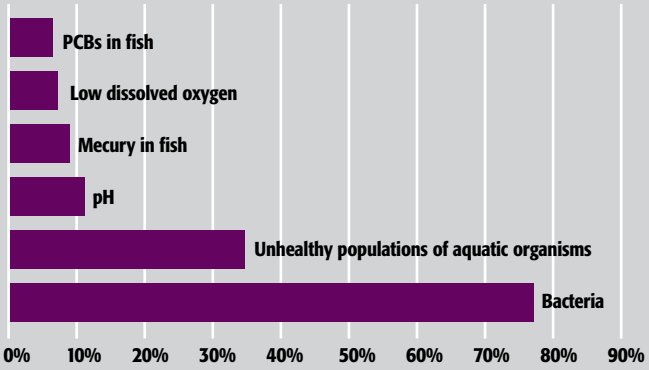
Making the Designated Grade?

A 2012 assessment of whether water quality supports the designated use of ~2,800 stream miles in Virginia's Potomac–Shenandoah River basin (3,160 miles were not assessed).

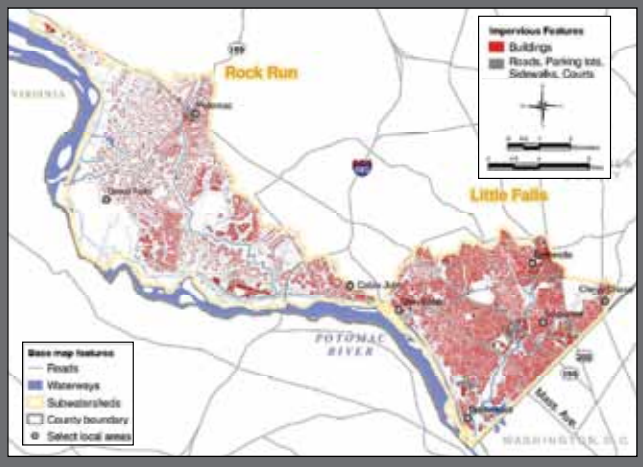


Designated use support summary for the Potomac – Shenandoah River basin. *Note that waters that have some data, but not enough to determine use support are classified as having insufficient data. Basin size (rounded to whole numbers): rivers, 5,957 miles; lakes, 4,140 acres; estuaries, 59 square miles.*

Failing grades. States such as Virginia often have not assessed whether waterways are supporting their designated uses, and those they are able to assess often get failing grades (above, red). Bacterial pollution is a leading cause of impairment (below).



What caused the impairment: *Percent impaired stream miles as a result of common pollutants in the Potomac – Shenandoah River basin.*

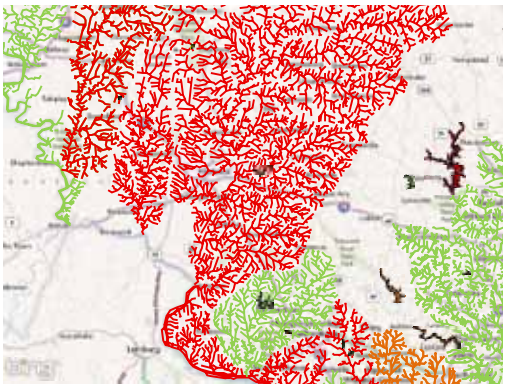


Hard problem. *The spread of impervious surfaces, such as parking lots and buildings, has contributed to a rise in polluted non-point runoff along the Potomac. The problem (red areas) stands out on this map of several small watersheds in Montgomery County, Maryland. Streams in these basins suffer from multiple impairments, including those caused by nutrients, poor habitat, and PCBs in fish.*

A Rogue's Gallery of Pollutants

Among clean water warriors, they make up an infamous Most Wanted list – the pollutants that can turn a sparkling, thriving river into an ugly, lifeless ditch. Along the Potomac, this rogue's gallery includes:

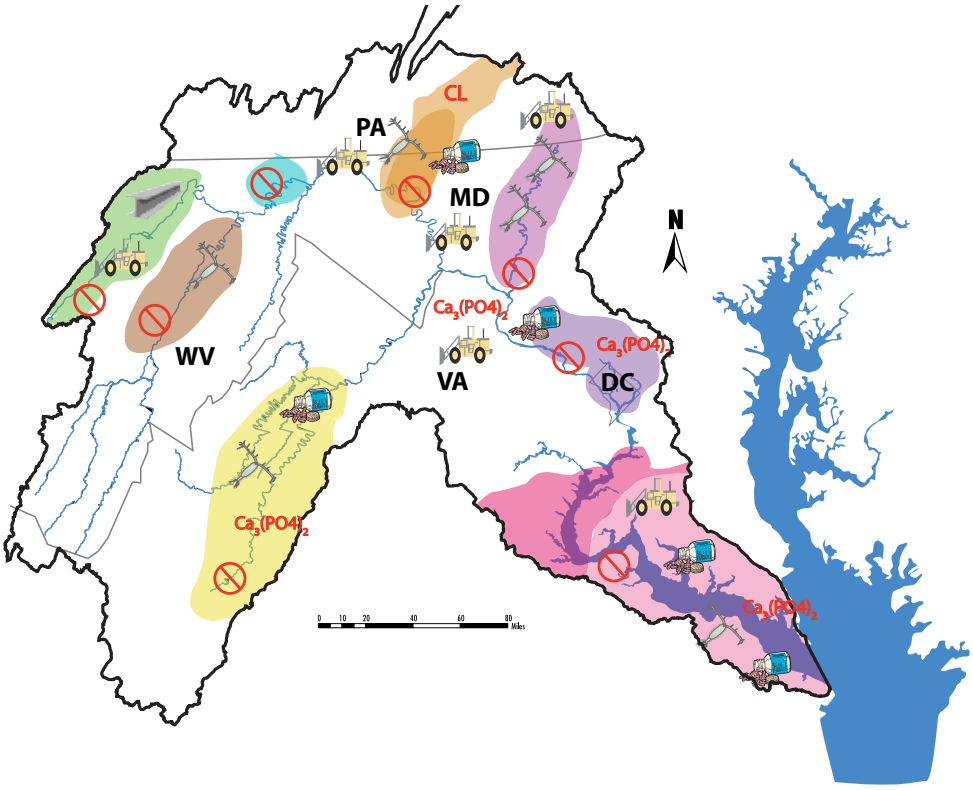
NUTRIENTS – In moderate quantities, phosphorus and nitrogen are essential for life. These days, however, we have too much of a good thing. From farmers fertilizing crops to homeowners greening up their yards, people are pouring too many nutrients on to the landscape. And when rain falls and snows melt, the chemicals wash into the river. Sewage treatment plants also contribute. The result can be problematic algae blooms that block sunlight and, when the algae die, feed bacteria that use up oxygen. The result is low levels of dissolved oxygen. **Excess phosphorus is a major cause of impairment in the Potomac's Upper North Branch, and in the 59-mile-long Monocacy River**, a major tributary, according to a 2012 study by the state of Maryland.

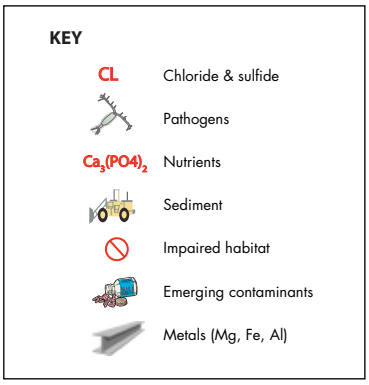


Stop sign. *Cleaning impaired waters (red) in Maryland (Frederick County, shown) requires stopping excess nutrients and pollutants from entering waters. From Maryland's 2012 Final Draft Integrated Report of Surface Water Quality.*

PATHOGENS – A drop of water can hold a teeming zoo of viruses and bacteria. To keep people healthy, the government has set standards for safe freshwater levels of an easy-to-measure bacteria, *Escherichia coli.* These bacteria are found in the guts of most warm-blooded animals, including humans. They typically do not cause disease themselves, but they can indicate the presence of excrement that might spread dangerous pathogens. After storms, fecal matter can wash into the Potomac: bacterial pollutants comes from failing septic systems or old sewer systems that can't handle storm surges—including antiquated pipes in Washington, D.C. In rural areas, it comes from farming operations that raise livestock in industrial quantities. And even wild animals, such as geese, or domestic pets, can add to the threat. **Recent studies show that the widespread use of antibiotics in people and farm animals can help make some of these disease-causing bacteria resistant to treatment – a worrisome trend that could be unintentionally breeding "super bugs."** The continued presence of water-borne pathogens is one reason Washington, D.C., bans swimming in its part of the Potomac, Prince George's County strongly advises against it, and health experts agree that it is not a good idea to swim after storms.

SEDIMENT – Poorly planned construction is too often a source of sediment that bury fish spawning grounds, block out sunlight and suffocate bottom organisms. Erosion from building sites, farm fields, river banks, and logging operations all contribute. The removal of streamside vegetation and forested tracts that soak up sediments makes existing problems worse. **Sediment was the major reason that 67% of stream miles failed to meet ecological health standards in Montgomery County's 130-square-mile share of the Potomac's watershed**, a 2011 study concluded. **The Monocacy River has been particularly hard hit by sediment, with a 2009 study estimating that erosion dumps nearly 100,000 tons of sediment per year into the upper part of the river, mostly from croplands.**





ONE RIVER, MANY IMPAIRMENTS

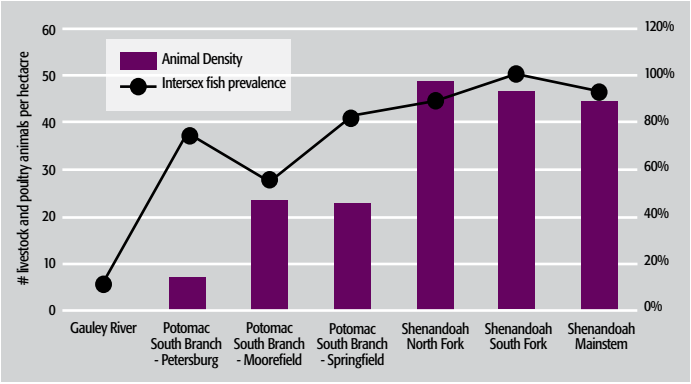
Although state officials are still working to assess water quality in many parts of the Potomac River basin, studies so far have revealed that many segments (colored areas) suffer from multiple problems (icons) that impair the river's ability to support designated uses such as swimming, fishing, or healthy habitat for aquatic life. In many places, for instance, a single section of river can be impaired by the presence of too much sediment, too many nutrients and pathogens, and dangerous chemicals in fish. The Clean Water Act requires states to take action to address these impairments, and help the river support the "highest" designated uses.

CHEMICALS – Chemicals enter the Potomac from numerous sources.

- **Chlorides & Sulfates** – These common chemicals enter waterways via runoff from farm fields and highways covered with road salt, wastewater facilities, mines, and industrial facilities. At low levels, they can make drinking water taste bitter. At elevated levels they seriously impair ecological health. **Researchers estimate that 750,000 tons of road salt are dumped each year on roads in the Potomac basin – that's 20 tons per mile of four lane highway**. One result: Chlorides and sulfates are stressing aquatic life in long stretches of the Potomac, including in the river's upper North Branch, "wadeable" feeder streams in Washington, Montgomery, and Frederick counties, and in Antietam Creek, a tributary, according to a 2012 Maryland study.

- **Industrial Compounds** – Over the last century, chemists have invented thousands of synthetic molecules that have produced numerous benefits. But there is also a dark side. Polychlorinated biphynels (PCBs), for example, are long-lasting chemicals once used widely in industry. Although PCBs were banned decades ago, contaminated soils continue to carry the chemicals into waterways, where they build up in fish. **Along the Potomac, officials have issued warnings against eating fish from long stretches the river's main stem and hundreds of miles of tributaries – including the Shenandoah River -- because they contain high PCB concentrations.** Other threats include the toxic metals mercury, cadmium, and arsenic. And a 2011 study found that Potomac levels of a perchlorate, a compound often used in explosives, can exceed Maryland's "advisory level" for safe drinking water during the summer and fall, and that no regional water treatment plants have the ability to remove the chemical.

- **Emerging Contaminants** – Better detection methods are revealing that a host of poorly understood chemicals are flowing down the Potomac. They include dozens of pesticides and herbicides, pharmaceuticals, residues from shampoo and perfume, and even breakdown products from things like manure and animal antibiotics. Research suggests that even low levels of some of these chemicals can disrupt the body's endocrine system, which produces hormones that regulate everything from reproduction to mood. Endocrine disrupters also appear to be contributing to the development of intersex fish in the Potomac, which carry both male and female characteristics. A 2012 study, for instance, found that **intersex smallmouth bass in the Potomac tended to be more prevalent, and be more severely affected, near wastewater treatment plants and areas with a high density of livestock and poultry farms.** However, emerging contaminants remain essentially unregulated, and do not figure in assessments of the Potomac's designated uses.



Is there a connection? *Relationship between animal feeding operations and the prevalence of intersex fish in the Upper Potomac Basin (Source: Blazer, V. et al. 2012.) Environmental Monitoring and Assessment 184:4309–4334).*

What's the Point?

Potomac pollutants have many sources. Essentially, however, they can be divided into two categories: point and non-point.

Point sources are typically entities that produce a single stream of waste. Along the river, they include dozens of large wastewater treatment plants, hundreds of industrial sites, medical facilities and businesses, and even large stormwater management systems that collect runoff from parking lots and housing developments. Such point sources typically require a government permit that sets allowable pollution levels – making them easier to regulate.

In contrast, non-point sources are much more diffuse and not as tightly regulated. They include things like farm fields, forests, parking lots and roads, where runoff can carry pollutants from a vast swath of land into waterways. **One big non-point problem in the Potomac basin is urban sprawl, which has been pushing up the amount of land covered by impervious, paved surfaces by about 1% per year over the past decade.** Another is the tons of manure and poultry litter that washes into the river from farming operations that raise thousands of animals at a time or use lots of waste as fertilizer.

While the Clean Water Act has helped greatly curb point source pollution along the Potomac, **non-point sources remain a big problem. For instance, non-point pollution was the root cause of the problem along 51% of impaired stream miles in Virginia's Potomac–Shenandoah watershed**, a 2012 study concluded, while agricultural practices were the culprit along another 37%.

Cracking The WIPs

Can WIPs crack the Potomac's pollution problems? This year, the five jurisdictions along the river – Maryland, Virginia, West Virginia and the District of Columbia and Pennsylvania – filed long-awaited Watershed Improvement Plans (WIPs) with the U.S. Environmental Protection Agency (EPA). In essence, each plan tells EPA how the state plans to follow-up on earlier plans and resolve impairments along the Potomac and other waterways to attain designated uses by 2025. In some cases, that might mean upgrading sewage treatment plants to remove more nutrients, or planting more streamside buffers to prevent runoff from farm fields. In others, it can mean installing green roofs to reduce stormwater drainage, or cleaning up old industrial site contaminated with PCBs. In practice, the plans create a blueprint for improving water quality by setting a goal – called a Total Daily Maximum Load (TMDL) – for each pollutant. One draft Maryland TMDL, for example, calls for cutting the amount of phosphorus in Rock Creek, a Potomac tributary, by 34% over the next 13 years, mostly by improving stormwater management and curbing fertilizer use. Some plans have set less ambitious goals, however, and implementing TMDLs isn't expected to be easy. In many areas, landowners and others aren't happy about having to change longstanding practices, such as using lots of fertilizer or paving over green spaces, to improve water quality.

Recommendations

The Clean Water Act is a great conservation tool from the 20th century, and we need to continue to implement fully the provisions of this bedrock environmental statute to attack remaining "from the pipe" sources of pollution. To achieve the Clean Water Act's goals (i.e., fishable, swimmable waters) in the 21st century, we must supplement it with other policies and methods that reduce pollutants that are beyond the its reach. To address the root causes of the pollution described in this year's report, we must pursue a three-pronged approach.

First, we must continue to **strengthen the regulatory frame at the state and local level** to reduce pollution from non-point sources. Specifically we must:

- Strengthen stream buffer ordinances so that there are green strips along our rivers and streams that can filter the pollution flowing across the land when it rains.
- Protect our forests and natural spaces. For example, in Montgomery County (MD), the County Council must enact both an Urban Tree Bill and a Street Tree Bill.
- Remove regulatory barriers that prohibit proven techniques that capture rainwater where it falls. The District's green roof initiative will go a long way toward greening downtown buildings.
- Enact strong stormwater pollution permits in urban areas that will mandate the reduction of polluted runoff. These permits must contain enforceable commitments to achieve water quality standards by a date certain and contain a monitoring program sufficient for officials and the public to assess whether the efforts are complying with the permit.

Second, to protect our rivers against polluted runoff, we must **increase funding for clean water programs**:

- Continue financial incentives through the proposed Regional Conservation Partnership Program in the next Farm Bill to help reduce nutrient and sediment loads from agricultural lands.
- Increase state funding for proven agricultural best management practices such as planting cover crops, fencing cattle out of streams, and managing manure. Virginia has made a productive start, but needs to continue to increase the annual funding.
- Create or expand local stormwater utilities that are modeled on successful funding programs, like those in the District of Columbia.

Finally, we must **provide incentives and technical assistance** to individual property owners:

- Educate farmers in agricultural areas such as the Shenandoah Valley about how best to apply fertilizer on row crops to protect water quality but also to enhance their crops.
- Show homeowners and businesses in urban and suburban areas how they can reduce impervious surfaces on their homes and land, such as the RainScapes program in Montgomery County.

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Safeguarding the lands and waters of the Potomac River and its tributaries and connecting people to this national treasure.

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