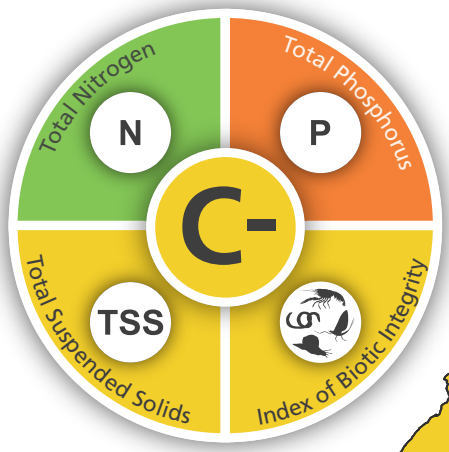
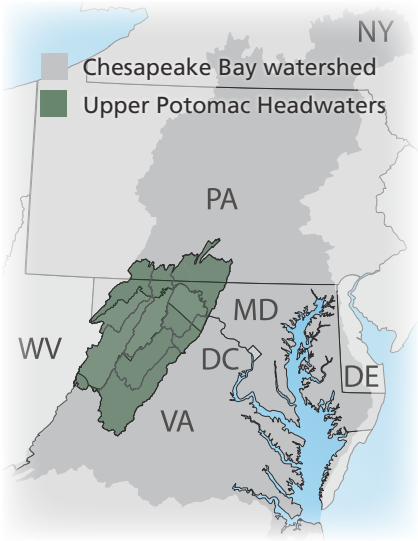
Upper Potomac Headwaters Report Card 2015



Stream health scale

- **A** *Excellent*
- **B** *Good*
- **C** *Fair*
- **D** *Poor*
- **F** *Very poor*
- **ID** *Insufficient data*



Indicators of stream health

N

Total Nitrogen from fertilizer, wastewater, auto emissions, and manure can lead to algal blooms that decrease stream health and contaminate drinking water.

P

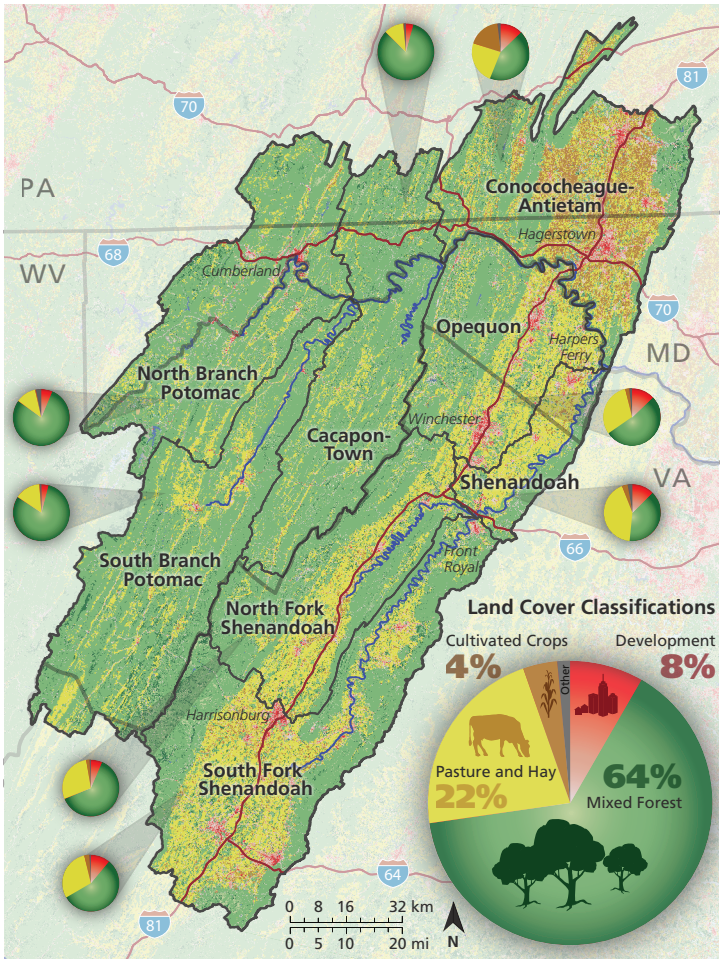
Total Phosphorus inputs from manure, fertilizer application, and erosion also contribute to algal blooms that decrease stream health.

TSS

Total Suspended Solids (TSS) come from soil erosion, mining, and unpaved roads. Excess TSS reduces water clarity and makes it difficult for aquatic organisms to survive.

Index of Biotic Integrity is a measure of diversity of the invertebrates (e.g. insects) living in the stream bottom. Agriculture, urbanization, and altered landscapes can reduce biotic integrity by changing stream flow, temperature, and pollution levels.

A mostly forested, yet modified landscape



The Potomac River Basin upstream of Harpers Ferry, where the Potomac and Shenandoah Rivers join before flowing eastward to the Chesapeake Bay, is known as the Upper Potomac Headwaters. Small streams make up 85% of 21,000 total stream miles in the Upper Potomac watershed and are home to many aquatic and semi-aquatic plants, animals, and microbes. Because these streams are intimately connected with the soil, headwater regions absorb large amounts of rain and snow, preventing floods downstream and recharging groundwater supplies.

The Upper Potomac Headwaters region, which covers an area of over 9,000 square miles and includes portions of four states and four geological provinces (the Appalachian Plateau, the Ridge and Valley, Blue Ridge, and Piedmont Plateau), was historically a heavily forested landscape. Today, the region is still dominated by forests, with an agricultural belt of cropland, pastures, and poultry farms on its eastern flank. Cropland is mostly located in the northeastern corner of the study region, whereas pastures and poultry houses are mostly in the southeast.

Land use is dominated by forests in all subregions except the Shenandoah. Forests cover 64% of the landscape. Agricultural and developed land is concentrated mostly along Interstate 81.

Stream impacts of landscape modifications

Agriculture

Livestock manure from cows turkeys and chickens, and the use of fertilizers for pastures and crops are nutrient sources N+P. Sediment runoff from cultivated cropland also negatively affects water quality.

Mining

Mining has immediate and lingering effects on water quality in the headwaters. Sediment runoff reduces water clarity and toxic mine drainage increases the acidity of the water affecting benthic organisms such as aquatic insects.

Development

Septic systems deliver nutrients N+P to groundwater. Stormwater runoff from roads, buildings, and parking lots increases stream water temperatures and can cause sewage to overflow into the streams. Another emerging threat is the extensive use of road salt NaCl during winter months. All of these changes affect brook trout, aquatic insects, and other species.

Landscape Processes

Historically, this region was entirely forested, and existing forests are mostly secondary growth. Atmospheric deposition of nitrogen is declining due to improvements in air emissions from power plants and automobiles.

Mining, manure, and stream health

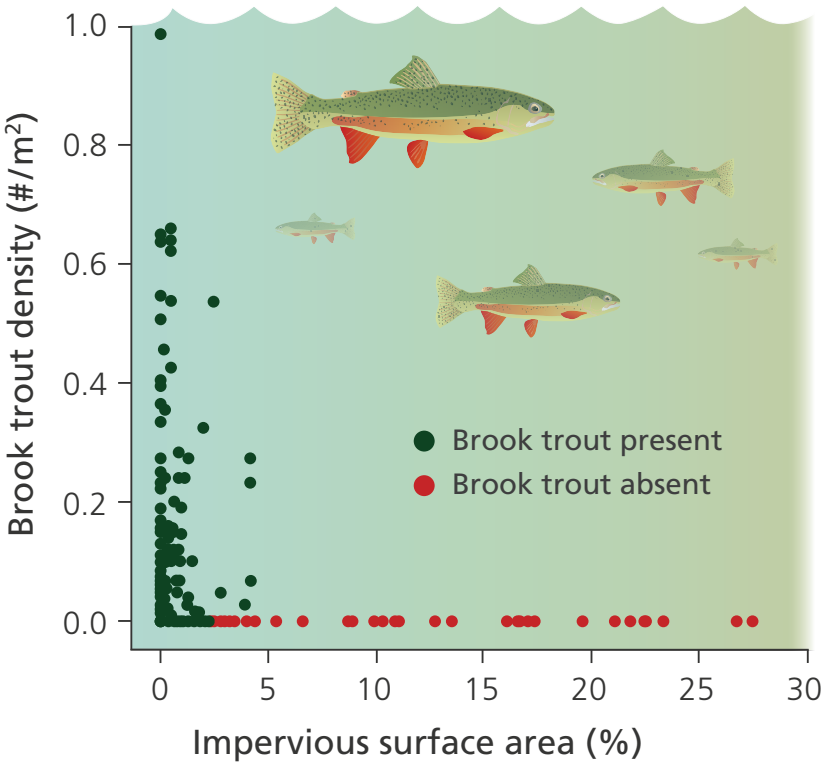
Animal waste, mostly from chicken and turkey farms, is a major source of water pollution in this region. According to the US Natural Resources Conservation Service, 333 chickens are equivalent to 1 dairy cow but produce 2.5 times the nitrogen and nearly 5 times the phosphorus in their manure. Nutrient pollution of rivers promotes noxious algae growth that degrades aquatic ecosystems. Best management practices can reduce nutrients from poultry operations that leak into waterways.

Past and current mining can leave a legacy of degraded stream health. In addition to toxins, waters draining from mines are often very acidic, which kills the insects and fish that eat them. Mining is also a source of sediment that is carried into streams during heavy rain and snowmelt, reducing water clarity and carrying polluting nutrients like phosphorus downstream. A number of best management practices can reduce acidity and sediment runoff from mining areas.

Coal bed mining and poultry feeding operations are spatially clustered, leading to cumulative impacts in the northwest (mining) and southeast (poultry). Photos: Stephanie Siemek (top), Mercy for Animals (bottom).

Brook trout need healthy watersheds

Brook trout are perhaps the "poster child" of the Appalachian wildlife. These beautifully colored fish live in cold, freshwater streams in undeveloped areas in the Upper Potomac Headwaters. Even minimal environmental disturbance caused by acid mine spoils, sediment loading, urban and suburban development, and higher streamwater temperature can wipe out brook trout populations. Brook trout now occupy around only 10% of their historic global range, but some watersheds in the upper Potomac are recognized as the remaining key strongholds for the species' survival. Brook trout play a significant role in area tourism and the local economy because fishermen come from around the country to catch "native brookies". Maintaining good brook trout habitat requires miles of clean, cool streams in mostly forested and minimally disturbed landscapes.



A minimal amount of impervious surface (e.g. roads) reduces brook trout populations. Stranko et al. *2008.*

What communities and individuals can do to help

Many resources are available that enable individuals to make a positive difference in their local watershed. The *Potomac Riverkeeper Network* supports pollution reduction and public river access and provides training for small groups interested in protecting local waterways. Volunteers in these small environmental groups, such as the *Savage River Watershed Association*, help maintain stream water quality and biological monitoring programs and promote environmental literacy to the public. The *Alice Ferguson Foundation* sponsors an annual Potomac River Watershed Cleanup that rounded up 1.2 million pounds of trash in 2015, with the help of almost 24,000 volunteers. Individuals and communities can also:

Savage River Watershed Association

Bill Townsend, Alice Ferguson Foundation

Volunteers for the Savage River Watershed Association collect samples to monitor streamwater quality (top). People work together during the 2015 Potomac River Watershed Cleanup (bottom).

Apply good stormwater management

- Maintain buffer vegetation lining streams.
- Plant trees, shrubs and ground covers that reduce stormwater runoff.
- Divert water off roads and trails to avoid soil erosion and flooding.

Reduce streamwater pollution

- Improve fertilizer and manure management.
- In the winter, use less salt or use alternatives on sidewalks, driveways, and roads.
- Keep litter out of waterways.

Join and volunteer with local watershed organizations

- Report pollution to your Riverkeeper.
- Participate in monitoring and clean-up activities in your local waterways.
- Share your knowledge with others!

About the Upper Potomac Headwaters Report Card

This report card was produced in December 2015 by The University of Maryland Center for Environmental Science and represents a joint effort of students and faculty at the Appalachian Laboratory in Frostburg and the Integration and Application Network. Visit *ian.umces.edu* for a digital copy and video presentation of this report card.

The aim of this environmental report card is to provide a transparent, timely, and geographically detailed assessment of water quality for the headwater streams of the Potomac River. Environmental report cards synthesize ecological data and communicate scientific results to the public to galvanize efforts to improve ecosystem health. Report cards inform policy and management, mobilize local communities, and stimulate research.

Scores were determined by comparing four ecosystem health indicators (total nitrogen, total phosphorus, total suspended solids, and an index of biotic integrity) to scientifically-derived thresholds that assess potential risks to ecosystem health. These indicator scores were combined into a Stream Health Index, which is presented as eight sub-watershed scores and an overall area-weighted Upper Potomac Headwaters score.

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