

Maryland's Streams, Imperiled by Urbanization

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There are at least 10,000 miles of freshwater streams in Maryland, a long system of unique, insular waterways, each characterized by its own shape, size, color and chemistry.

Diverse Streams, Diverse Life

Different stream types largely reflect the rocks and soil over which they flow. In places with abundant limestone, streams are alkaline and relatively constant in temperature because cracks in the stream bed feed groundwater to the stream. Streams flowing slowly through sand and peat on Maryland's eastern shore are, by contrast, naturally acidic and often swampy. Cold, fast flowing streams are found in the mountains of western Maryland. These and other types of streams are further divided into distinct habitats such as riffles, pools, runs, glides, back-waters and eddies.



A western Maryland, coldwater stream



A blackwater stream on Maryland's eastern shore

This diversity of stream and habitat types has made way for many different types of stream dwelling animals. Many of these animals are specialists, living only in a certain habitat in a certain type of stream. With such narrow habitat requirements, if something happens to the small areas where these stream specialists live, they usually have no place to go to escape. Obviously, a fish cannot jump onto dry land and slither away to escape polluted water or a drying stream.



An urban stream following a rainstorm

This delicate existence is made even more precarious by the fact that the water in a stream at some point flows over surrounding land — and a lot of it. A stream that is two-miles long and three feet wide covers less than an acre, but may collect water from a 900-acre watershed.

Biological Diversity of Maryland Streams

-Fishes (96 Species)

**-Stream Insects
(Hundreds of Species)**

-Salamanders (10 Species)

-Freshwater mussels (16 Species)

-Crayfish (8 Species)

Most of Maryland's land drains into freshwater streams. As rainwater falls, it picks up chemicals in the atmosphere such as mercury, sulfate, nitrate, acids and myriad contaminants. Once it reaches the ground, the water carries soil particles and other chemicals over fields, forests, pastures, roads roof-tops and parking lots.

In places where fields and forests prevail, most of the water seeps into the ground before making its way to a stream. In places where land is covered with asphalt, concrete and other hard materials, rainwater flows more directly into streams. This increases the frequency of flooding — which has drastic implications for the physical attributes of the stream channel — as well as erosion, sediment deposition, warmer water temperatures and more pollution. These changes can have direct, harmful effects on stream organisms or indirectly threaten them by destroying their habitat.

Imperiled by urbanization

Given these stressors, it's no wonder that stream-dwelling animals are the most imperiled groups of organisms in the U.S. and here in Maryland. Specifically, 14 of Maryland's 16 native freshwater mussel species and 41 percent (29 of 71) native freshwater fish species are on Maryland's list of rare, threatened and endangered animals (dnr.maryland.gov/wildlife/rteanimals.asp). Most have declined to a point where their future existence is difficult or impossible to guarantee, often because their habitats are shrinking and barely supportive. Many stream-dwellers are presumed to have been wiped out of certain watersheds or from Maryland entirely.

Streams in urbanizing areas appear to be in the most imminent danger, mostly because of increased runoff from hard or impervious surfaces. Over the past 30 years, Maryland's human population has increased by 30 percent, while land consumption has doubled. And with more than one million new residents anticipated by 2030, even more of Maryland's landscape will be covered with hard surfaces over which rainwater and snow melt destined for streams must flow.



A satellite photograph showing an urbanized area of Maryland - blue lines represent streams

One of the most revered freshwater fish in the eastern U.S., the brook trout, has fallen victim to the impacts of urban run-off and is now a “Watch List” species on Maryland’s List of rare, threatened, and endangered animals. Department of Natural Resources (DNR) biologists recently documented the loss of Maryland’s only native trout species from several watersheds. Using aerial photos dating back to the early 1970s, biologists determined that in most cases the trout were lost by the time the area covered with roads, parking lots, houses and other impervious features exceeded seven percent. This means that in a 1,000-acre watershed, brook trout disappear when only 70 acres of forests were cut down and replaced by suburban development.

Studies indicate that levels of impervious surface as low as five percent -- often existing in heavily forested or farmed watersheds -- may be enough to exclude many stream dwelling species. In fact, forest buffers still exist along the large majority of streams where brook trout were lost. Nearly every stream species listed as rare, threatened or endangered in Maryland is found exclusively in watersheds with very low urban development.

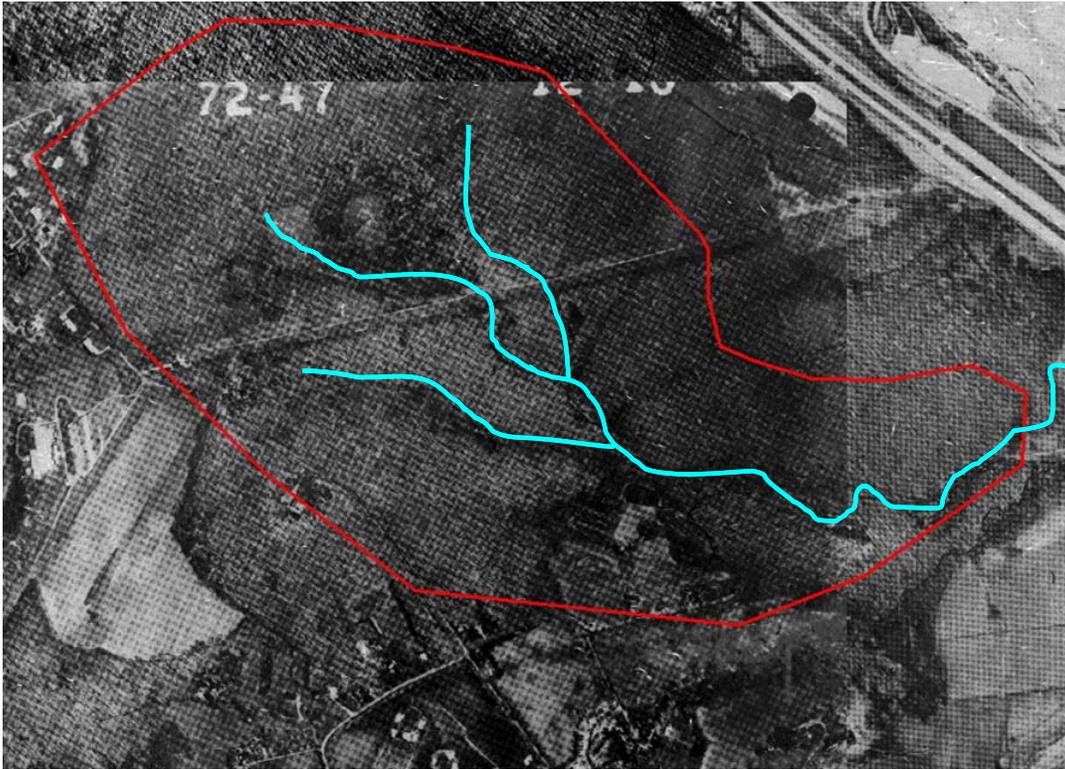


Photograph of a brook trout, Maryland's only native trout, by John White

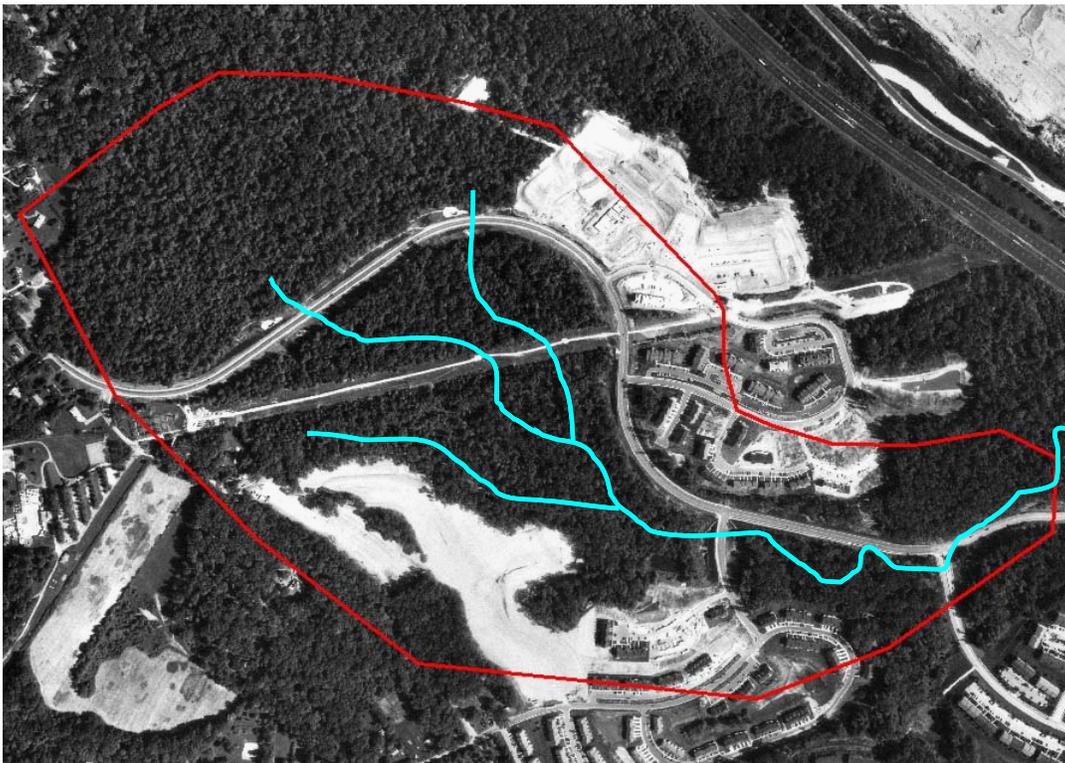
The brook trout is not the only stream-dweller that has been dramatically impacted by urbanization. While no one can say for sure why the Maryland darter -- a fish found nowhere else in the world -- has not been seen for over 20 years, we do know that the impervious land cover in its two known watersheds now exceeds five percent.



Illustration of the Maryland Darter, a fish found only in Maryland, by David Neely



An aerial photograph of the Goodwin Run Watershed in 1972, when brook trout still lived there



An aerial photograph of the Goodwin Run Watershed in 1992, when brook trout were no longer found there



An aerial photograph of the Goodwin Run Watershed in 2004, when development was complete

While we are losing native species from urban areas, we seem to be gaining invasive, non-native species, such as the northern snakehead and virile crayfish. These invasive species are hardier and appear to tolerate urban run-off with little to no harmful effects. In fact, some may actually thrive in urban streams, where they no longer have to compete with natives for food or living space.



A wanted poster for the northern snakehead, an invasive fish species

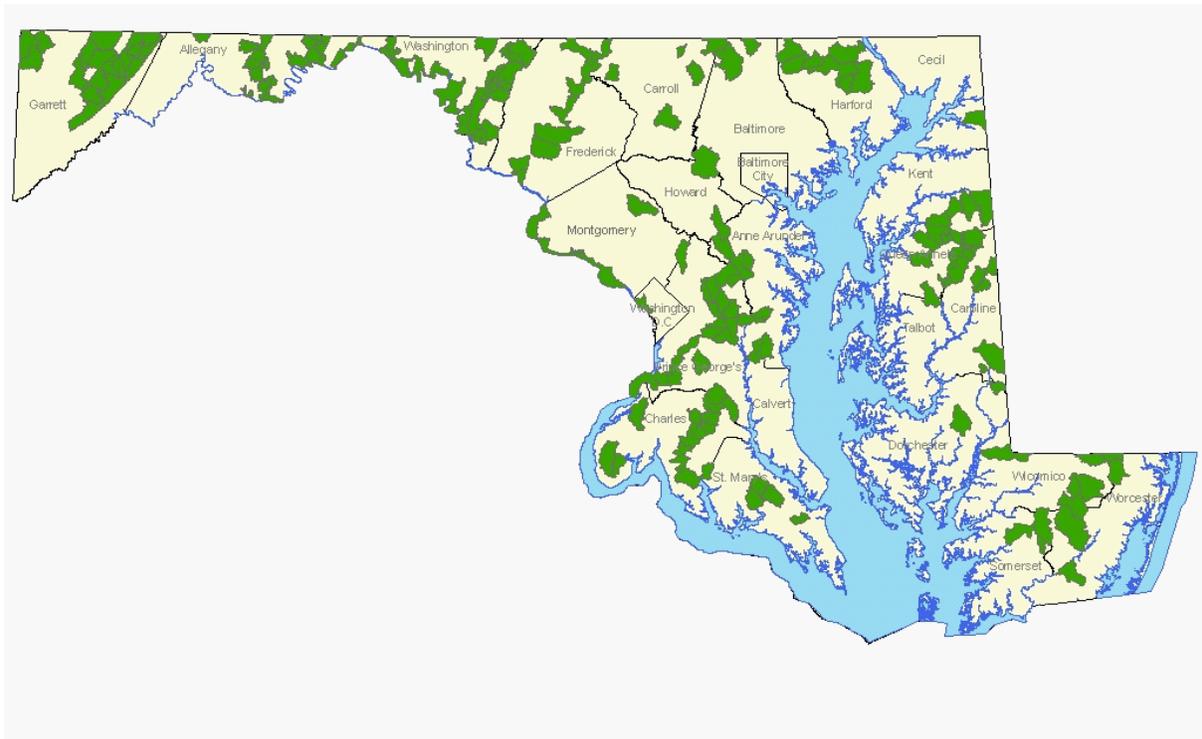
Hope for the future?

Restoration projects in urbanized streams may provide some relief from the nutrients and sediment loads that move downstream and eventually end up in Chesapeake Bay. However, there is little hope that Maryland's brook trout will make a comeback, and even less optimism for species like the Maryland darter that may be completely lost. Extinction is forever.

Still, there is good news. Many Maryland streams are still fed by relatively undeveloped watersheds, and many rare species like brook trout still live in the cleanest remaining streams.

Despite the increased pace of development, more than 22 percent of Maryland's landscape is today permanently protected; nearly 22,000 of those acres have been preserved in the past two years alone under Program Open Space -- which uses Maryland's innovative new GreenPrint tool (www.greenprint.maryland.gov) -- to target important ecological areas like these fragile watersheds, for conservation.

Carefully planned development, along with the continued preservation of our natural landscapes is our greatest hope for protecting the amazing diversity that Maryland's streams provide and the critical habitats these animals need to thrive.



A map showing watersheds with Maryland's largest populations of rare, threatened, and endangered stream species (stronghold watersheds). The stronghold watersheds are priority areas for stream biological conservation and require aggressive protection from future urban development.

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