Mid-Atlantic

Species Summaries

LISTING STATUS: red (ESA listed as Threatened or Endangered), yellow (not ESA listed but federal sensitive species or state species of concern (majority of states), green (not listed in majority of states)

CURRENT RANGE: red (10 percent or less), yellow (11-25 percent), green (>25 percent)

HISTORICAL RANGE: red (<1,000 miles), yellow (1,000-10,000 miles), green (>10,000 miles)

TROUT UNLIMITED

Brook Trout (Mid-Atlantic)

Category	Status	Explanation
Listing status		Species of Special Concern (MD, TN)
Current range		59 percent of historical stream habitat currently occupied
Historical range		Widely distributed historically in the region, over 50 million acres
Climate change		Stream warming and increasing variability of precipitation are issues
Energy development		Epicenter of shale gas development in the east; ongoing and legacy issues with coal mining, conventional oil/gas wells
Non-native species		Introduced brown and rainbow trout pose continual competitive and predatory threats
Water demand		Water demand associated with energy development can cause acute stream flow issues
Data issues		Species distribution, stream temperature, passage, and flow data are largely lacking

Brook Trout *(Salvelinus fontinalis)*

Brook trout in the mid-Atlantic region are found in streams that drain the highlands of the Allegheny Plateau in Pennsylvania, West Virginia and New York as well as the Blue Ridge and Valley and Ridge Provinces in Virginia, Maryland and New Jersey. Brook trout habitat is found within an hour's drive of most of the major cities in the region – Washington, D.C., Philadelphia, Baltimore, Pittsburgh – making them one of the most "accessible" trout species in the US.

Brook trout thrive in ecologically intact watersheds: over half of the remaining brook trout populations occur in watersheds with at least 80 percent forested lands (1). As the amount of forest cover decreases in watersheds and especially along streams, stream temperatures become too warm for brook trout and reduces their ability compete with non-native species like brown trout (2, 3). Declines in brook trout populations in the region have been linked to land conversion and the associated degradation of instream habitat, especially sedimentation related to agricultural land use, displacement by introduced rainbow and brown trout through competition and predation, and habitat fragmentation caused by dams, culverts, or impaired water quality.

Regional Trends

Brook trout require cold, clean water and the highlands of the mid-Atlantic region provide a large concentration of this habitat. The margins of the core habitat will be vulnerable to loss of brook trout with a warming climate. One of the key conservation strategies in coming decades will be identification and protection or restoration of those habitats with qualities that make them resistant to climate change effects. Streams that are highly dependent on springs and groundwater will be less susceptible to increases in temperature or decreases in precipitation.

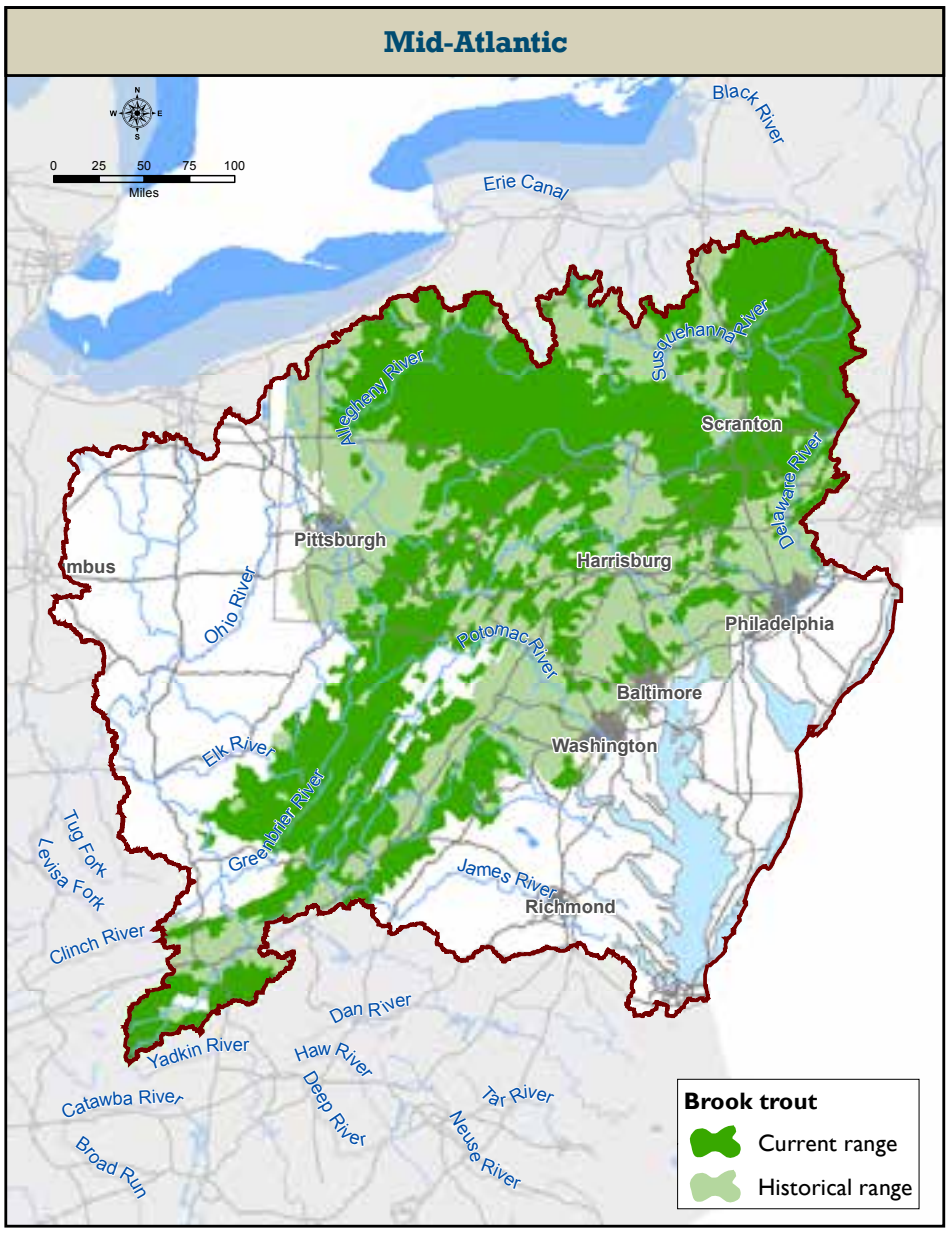
The core of brook trout distribution in the mid-Atlantic region overlaps with the epicenter of the shale gas boom in the East. Pennsylvania saw the first wave of development in the Marcellus and Utica Shale formations and, since the early 2000s, nearly 8,000 unconventional gas wells have been drilled across the Allegheny Plateau. Development has expanded in

recent years to West Virginia, Ohio and Maryland. The unconventional wells in the region typically use hydraulic fracturing, or fracking, techniques in which a pressurized mix of water, sand and chemicals are sent down deep wells to release natural gas within the buried rock formations. Shale gas development is associated with impacts to aquatic resources such as sedimentation from road construction, flow impairments from water withdrawals, and water quality issues related to transportation and disposal of hydraulic fracturing chemicals and effluents (4). Shale gas resources are also present in New York, but hydraulic fracturing techniques were prohibited in that state in 2014. Even outside the footprint of the shale gas resource, aquatic habitats can be threatened by poorly planned pipeline placement as natural gas is transported to customers along the eastern seaboard. TU staff and volunteers have been monitoring water quality in the region of shale gas development and working with industry and state agencies to ensure that development of the resource, where it does occur, does not impair native trout fisheries.

Swaths of brook trout habitat in the region have experienced several waves of natural resource development over the last 200 years, from widespread logging and conventional oil and gas development, to large and small scale coal mining. Acid deposition rates (primarily from the burning of fossil fuels) are also high along the Allegheny Plateau and have impaired many miles of streams (see Southeast region report). These legacies have left a mark on the brook trout landscape, none more prominent than the water quality issues created by acid mine drainage.

The demand for water for agricultural, municipal and industrial uses is high across the region, but mostly concentrated in the developed valley bottoms away from brook trout habitats in the headwaters. In the headwaters, one use of water with potential consequence for brook trout is withdrawals for hydraulic fracturing, which can alter flow regimes, especially at low flows and when withdrawals do not require minimum flow past the points of diversion (4,5). Climate change will be associated with some additional uncertainty for water supplies.


Brook trout



Historical and current distributions of native brook trout in the Mid-Atlantic Region.

SUCCESS STORY:

Recovering Trout Habitat in Acidified Streams

BY AMY WOLFE AND SHAWN RUMMEL, TROUT UNLIMITED

Throughout the central and southern Appalachian mountains, more than 13,000 miles of Eastern brook trout habitat have been impaired by pollution from unregulated, historical coal mining operations. Although abandoned mine drainage continues to be one of the top causes of impairment to coldwater streams in the region, restoration and reconnection of brook trout populations in these waters is possible and has been realized in many watersheds.

Coal mined from the central and southern Appalachian Mountains played an important role in shaping the social and economic fabric of this region and was a major factor in boosting the Industrial Revolution across America. However, prior to the federal Surface Mining Control and Reclamation Act of 1977, coal mining was largely unregulated. As a result, thousands of streams and rivers became polluted with abandoned mine drainage (AMD). Over 10,000 miles of stream are impaired by AMD in West Virginia and Pennsylvania alone.

The Kettle Creek watershed, in north-central Pennsylvania, contains top-notch trout fishing, pristine mountain streams and large remote tracts of public land. However, this watershed has not escaped the pollution legacy of historical coal mining. Coal mining in the lower Kettle Creek watershed began in the late 1800s and larger-scale surface mining occurred through the early 1970s. During this period, mining was conducted with little to no requirement that miners restore the land and water when mining operations were completed. The historical mining in this area left behind over 1,000 acres of scarred mine lands and approximately 12 miles of Kettle Creek and its tributaries became acidic, with high concentrations of heavy metals such as iron and aluminum that are toxic to fish and other aquatic life.

Twomile Run AMD treatment project. Photo by Amy Wolfe

Recovered Middle Branch below the AMD treatment system. Photo by Amy Wolfe

Since 1998, more than $3 million in grants from government, non-government and philanthropic programs has been spent to evaluate, plan and construct AMD projects in the Kettle Creek watershed. Over a dozen projects have been completed to date, including construction of AMD collection systems, drilling and installation of groundwater monitoring wells, mine pool stabilization, land reclamation and AMD passive treatment systems. In late 2013, construction began on a 100-acre land reclamation project, funded by a $12.2 million contract from the Pennsylvania Department of Environmental Protection. This project is a major first step for the last phase of AMD cleanup that will ultimately lead to the full recovery of the lower Kettle Creek watershed.

Collectively, these projects have led to improved water quality in the watershed. Water that once flowed from abandoned mines with a pH of 2.5 and iron and aluminum concentrations above 50 mg/L is now being treated to a pH of 7.0 and metal concentrations of less than 0.5 mg/L. These dramatic improvements in water quality have allowed benthic macroinvertebrate communities and native brook trout to naturally recolonize sections of stream that have long been devoid of life.

To date, nearly seven miles of coldwater streams have been restored and reconnected in the Twomile Run subwatershed in lower Kettle Creek. After the construction of nine treatment systems, brook trout have returned and are now thriving in previously dead sections of streams. The mainstem of Kettle Creek is also on the brink of full recovery, only needing a final boost of water quality improvement to benefit the low numbers of various fish species already living there.