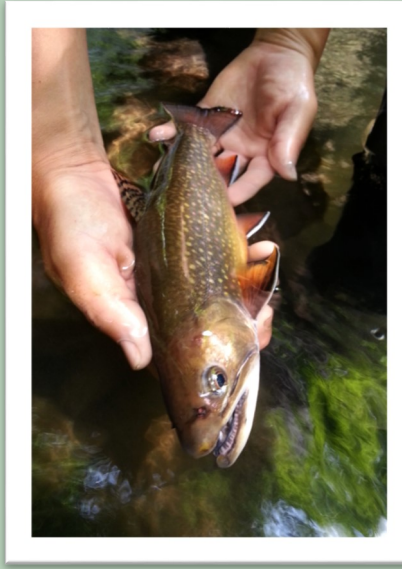


# BROOK TROUT STATUS AND TRENDS IN MARYLAND

Results from 2014-2018 Statewide Survey

The eastern brook trout *Salvelinus fontinalis*, is Maryland's only native salmonid and an important ecological indicator of stream health.

Brook trout require cold water temperatures year round (<20°C) and relatively pristine conditions to survive that include minimal sedimentation, complex instream habitat, and intact riparian buffers. Because of these requirements, we consider brook trout an aquatic "canary in the coal mine". If habitat conditions are impacted, then brook trout will be the first to go. In Maryland, it is estimated that since English colonization brook trout have been extirpated from 62 percent of their native habitat. Central Maryland has seen the most drastic declines in brook trout, although losses have occurred in the more mountainous western counties as well. We developed this study to provide the first statewide synoptic survey of the status of brook trout in Maryland strictly from empirical data. In addition the results from this survey will be used to set the baseline for known populations as it relates to tracking progress towards the Brook Trout Outcome that was included in the [2015-2025 Chesapeake Bay Agreement](#). This outcome calls for an 8 percent increase in occupied brook trout habitat in the Chesapeake Bay watershed by 2025.

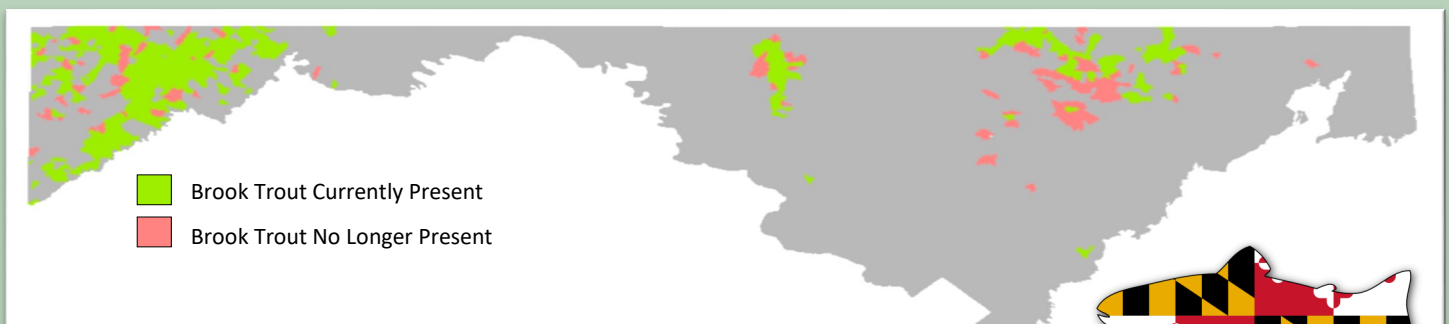


## Methods

In order to establish a baseline for brook trout occupancy we reviewed all available brook trout data from a variety of sources (e.g. Freshwater Fisheries Program and Resource Assessment Service, University of Maryland, etc.) including anecdotal information. Any sample locations where brook trout were collected or thought to be present prior to 2014 and after 1987 were included as recent historical occupancy. We used backpack electrofishing to sample these historically occupied streams to determine brook trout population status.

## Results

Brook trout were present in 317 of 440 historically occupied catchments, which indicates a 27.0 percent loss statewide. The largest decline was seen in the Central region (*Carroll, Howard, Montgomery, Baltimore, and Anne-Arundel Counties*), which experienced a decline of 49.3 percent since 1987. The losses were less severe in the more western counties, 21.2 percent for Frederick and Washington counties, and 14.9 percent for Allegany and Garrett counties. For the purposes of the Chesapeake Bay Brook Trout Outcome it was estimated, prior to this recent survey work, that there was 604 km<sup>2</sup> of brook trout watersheds in Maryland, therefore an increase of 48 km<sup>2</sup> is required to meet the eight percent goal.



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All regions where brook trout exist saw declines, with the largest losses occurring in the central region. These declines are typically attributable to anthropogenic (human caused) related changes to the landscape that impact water temperature, increased sediment deposition, loss of forest and riparian cover and increased runoff from impervious surfaces. Additionally, acid mine drainage, climate change, and exotic trout species impact brook trout distributions in many parts of the state. Garrett County continues to be the stronghold for both occupied brook trout habitats and population densities in Maryland. However, streams along the Catoctin Mountains and the Gunpowder River watershed are also strongholds for brook trout in their respective regions. In addition many of our populations are low in abundance and are geographically isolated, which places them at even higher risk of future extirpation. The information from this study is vital to having the most recent data on brook trout status and locations and is important for focusing brook trout conservation efforts in the future.

**Looking Ahead** The distribution of brook trout in Maryland continues to contract from the historical range. This assessment serves as a reminder that the declining trend in our brook trout population is ongoing and likely to continue without further conservation and management measures. As such, the Chesapeake Bay goal of an eight percent increase by 2025 was based on the previous baseline of 604 km<sup>2</sup>.

Therefore, complete success towards this goal would need to account for the observed 75km<sup>2</sup> loss from this study, putting the actual total at 123km<sup>2</sup>. While this is a lofty goal, freshwater fisheries is committed to taking the lead on brook trout restoration in Maryland and is working on a new conservation plan to address these declines and bring in multiple conservation partners to help with these efforts.

Conservation efforts for brook trout in the past have typically focused on protecting existing resources and restoring reduced or extirpated ones. Due to constant changes to the landscape, opportunities for resource protection and enhancement are routine and ongoing, often accomplished through regulation, coldwater policy implementation, and environmental project review. In addition to regulatory efforts, a variety of funding

programs also exist that are used to pursue habitat enhancement projects where brook trout resources currently exist and have been impacted by changes to the landscape. Conversely, brook trout re-introduction opportunities (i.e. establishing a new population) are much more limited than conserving existing populations because of the difficulty and cost of restoring adequate habitat. However, there are some potential avenues statewide for the immediate reintroduction of brook trout where past disturbances have eradicated them. These include locations where water temperatures and in-stream habitats have improved and no source population is nearby to allow for natural recolonization.

Regionally, there are different impacts to brook trout resources that provide the greatest (and often quickest) opportunity for restoration and do not involve large-scale habitat projects in the watershed. For example, acid mine drainage remediation work has improved water quality quickly at a number of locations and allowed for almost instant recolonization of brook trout through reintroduction and natural immigration from surrounding resources. In the more central and eastern parts of the state, converting co-existing brook and brown (exotic species) trout populations to all brook trout pop-

ulations may present another opportunity to accomplish conservation goals. Regardless of the location or the type of brook trout restoration method, each presents unique challenges. Some of the challenges are biological (reinvansion, removal technique) and some are social (lack of angler support, controversy over removal, illegal reintroductions, and cost).



Ongoing threats: **Top**-urban sprawl continues to reduce forest cover and increase impervious surfaces. **Middle**-untreated acid mine drainage is still responsible for over 100 fishless stream miles in western Maryland. **Bottom**-soil erosion from agricultural fields still threatens brook trout habitat across the state. Photo credits; Google.

This 5 year statewide monitoring project was a tremendous step in understanding the status of Maryland's Brook Trout. For the first time we now have current, synoptic knowledge of where our brook trout still occur, based entirely on scientifically collected data. This information will help direct and guide future reintroduction and conservation efforts. As part of this study a list of recommendations were generated to direct future brook trout monitoring sampling and research, and includes:

- Update the 2006 Brook Trout Fishery Management Plan with the most recent information and outline a conservation plan moving forward
- Repeat the five-year statewide monitoring census, start date to be determined
- During 2020 sample those sites where recent angler reports suggest brook trout are currently present and incorporate that information into the current brook trout distribution, where applicable
- Investigate the utility of eDNA technology to verify the status of streams that were listed as extirpated during the survey
- Develop a list of currently un-occupied streams for each management region with specific biological/water quality parameters that may be candidates for immediate brook trout reintroduction
- Review all sympatric (brook trout + other trout species) brook trout populations to determine if opportunities exist to change a sympatric population to allopatric (only brook trout), considering cost benefit analysis of the locations, and weighing conservation, social, and monetary impacts
- Using the population data from the Round One assessment (2014-2018), develop a rating system (based on population density and size structure) for publicly accessible brook trout streams to benefit trout anglers in Maryland and provide this information on the DNR Brook Trout Program website
- Continue to investigate catchments where no historical records for brook trout occupancy exists and have not been sampled previously



Protecting Brook Trout: Top left, staff conducting an environmental site review. Top right, treatment of acid-mine drainage in western Maryland. Bottom left, riparian fencing and hardened stream crossing for cattle. Bottom Right, measuring a trophy brook trout during a FABS stream survey.

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