Reeling in Nothing: The Disappearance of Brook Trout in the Eastern United States

Every year, my family and I make the same three-hour trip down to Bennett Springs State Park. We pack up the car with our fishing rods and boxes of bait and vests and nets and waders that we'll wear to stand in the ice-cold spring for two hours. We always go right at the end of August because that's when the brook trout will be spawning; it creates the perfect opportunity for us to reel them in.

Brook trout (or mountain trout, as the Bennett Springs locals call them) were first introduced to the state park in 1900 when the Missouri Fish Commissioner translocated 40,000 of them into the spring. These trout typically reside along the eastern coast of the United States, everywhere from Northeast Canada to Georgia. They naturally acclimated to the spring over time, most likely because they need cold, clean water to live, and if I know anything about Bennett Springs, that water is definitely cold. The water temperature during the middle of the day usually stays around 54°F. To go fishing, I would wear three pairs of socks underneath my waders that were tucked into my rubber boots. My feet were still blocks of ice after ten minutes. I usually had to leave my dad and waddle back to the side of the spring to dry off on the rocks. Once when I was exiting the spring, my numb feet, moving at a glacial pace in the molasses water, slipped on one of the moss-covered rocks that carpet the bottom of the lake. I face-planted, soaking my vest and hair. When I reappeared, my lips were more blue than the water I had fallen into, and it took a thirty-minute shower at a skin-burning temperature to get my hands to stop shaking.

Unlike me, the brook fish flourished in this water temperature, and they quickly became the favorite fish to catch by the locals. Growing to be around two-feet long and weighing seven pounds, they were the perfect size for my scrawny arms to reel out of the water and into my

waiting net. Their greenish-brown coloring and marbled bellies look similar to the other trout and catfish in the spring, but their red fins and tail made them stand out to my seven-year-old self. My cousins and I would point out the red and blue circles that coated their stomach when my dad laid his catch out to dry in straight rows on the gravel road that circled the spring. I used to cry when we cooked the fish for dinner, my dad grilling it over the fire pit that sat out front of our two-room cabin, but I knew there would be more to catch tomorrow. I would get to watch from the side of the spring as my dad, always wearing his dark gray bucket hat and tinted sunglasses, went out to the middle of the water and became a statue, silently waiting for a bite.

In my mind, there was always going to be a steady stream of trout waiting to be caught by my line. At Bennett Springs, this was true. Brook trout were not a native species, so more could be relocated to the spring depending on necessity which was determined by the number of seasonal fishing tags bought each year. On a larger scale, this was not the case. In areas across the Eastern United States—and in many places where brook trout was the only native trout species—their eradication had been gradually increasing since the late nineteenth century. I hadn't known this as a kid, but the reason brook trout had been introduced to Bennett Springs in the first place was because environmentalists were trying to find cooler waters in the midwest to put the declining species. In his article for the Natural Resources Defense Council, Steven Kinsella points out that the brook trout could no longer survive in their original habitats because of the 1.5°F increase in average air temperatures that had resulted in a 7-16% loss of trout habitat throughout the continental United States. This might not seem like a staggering change, but brook trout are especially picky about their water temperature. The Conservation Strategy Work Group for Eastern Brook Trout determined that the fish need their water temperature to stay below 65°F in order for them to survive. If the water temperature rises above 75°F, even if it's

only for a few hours, the result is deadly. Thousands of fish will turn belly-up and rise to the top of the water, lining fin to fin as they float downstream in a morbid parade. That's the consequence after just a few hours. If these temperatures continue to increase, 75°F will be the new normal. This could effectively eliminate brook trout from all lower-elevation habitats.

This steady increase in temperature is occurring because of the doubling of carbon dioxide emissions by humans that are not being absorbed by the atmosphere, leading to global warming. While this is the main problem, increased human interaction with the planet is throwing more fuel on the fire. As logging and resource extraction close to eastern rivers and lakes become more popular, sediment is increasing in the habitats of the brook trout. This forces the fish to swim closer to the surface, making them feel the heat even more. This sedimentation also creates obstructions in the rivers that prevent brook trout from traveling downstream, leading to habitat fragmentation. The brook trout used to be able to travel to deeper waters during the summer if their regular habitats became too warm. Now their waterways have been divided into isolated pieces. This essentially locks them in a cage with invasive species, all competing for space. Environmental tourism in the eastern United States started to increase throughout the twentieth century, so brown and rainbow trout were extracted from their native habitats in the West and introduced to the East to increase sports fishing in the area. These invasive species began to take over the already-decreasing habitats of the brook trout. Now the brook trout had to either compete for their own spawning and habitat space or retreat to the higher-elevation streams in the West and try to adapt. In many places, the brook trout didn't have this option. Man-made dams prevented their escape, forcing them to sit in the heated waters that had once been their home, completely surrounded, with nowhere to swim.

The Conversation Strategy Work Group reports that intact brook trout populations are now only found in 5% of the watersheds they used to inhabit over their entire eastern habitat. Genetic diversity in brook trout is steadily decreasing because individual populations are getting separated over large spaces, leading to genetic isolation and inbreeding. Kinsella notes that without genetic diversity, these trout are more susceptible to natural droughts, diseases, and predators because they do not have the inherited traits to fight off these challenges. The decline of brook trout does not only indicate that another species might be on their way to endangerment and possibly extinction. It also shows that our waterways are becoming increasingly polluted. Brook trout are viewed as an indicator of a healthy river ecosystem because they are sensitive to low oxygen, pollution, and changes in pH. If they are dying off, these waterways are dying off as well. The problem is bigger than just one species. The brook trout may be the first to start disappearing, but they will not be the last. The other species living in these habitats will be the next to go. Yes, some of these species can be translocated to other areas, but not all of them will be able to survive. I can still go to the side of the spring and peer down to see red tails flipping in the water, but one day I may not be able to. If this kind of disappearance can happen to the brook trout—the state fish in nine states—it can happen to any species.

It may not be too late to do something about the eradication of the brook trout. They are not yet on the Endangered Species List. Many environmentalists have already started trying to save the brook trout, although some of their methods have been controversial. The National Park Service attempted to remove all rainbow and brown trout in the Great Smoky Mountains National Park in 2007 to try and reintroduce the brook trout to their natural habitats without the threat of invasive species. In order to accomplish this, “biologists essentially poisoned the water for browns and rainbows with a pesticide.” While the biologists promised this had minimal

effects on other species, and it did open up the habitat for brook trout to return, it killed off entire species in certain areas along the way and caused destruction to this ecosystem. Other groups are taking a less deadly approach to conservation. Trout Unlimited, a national group in trout conservation, is tackling the problem of warming water by taking down the small dams and culverts that prevent brook trout from traveling downstream. They also created a Brook Trout Portfolio Analysis which "shows areas where brook trout have the best chance to survive in the coming decades as conservationists cope with climate change." This tool documents the water pH, public land access, elevation, spring sources, and proximity to logging and development to determine the best site to relocate the declining populations of brook trout. It's a small step (more of a nudge) in the right direction, but it's something.

In Cormac McCarthy's novel, *The Road*, he speaks on the beauty of the brook trout. He says that "on their backs were vermiculate patterns that were maps of the world in its becoming. Maps and mazes. Of a thing which could not be put back. Not be made right again." Maybe McCarthy is right. Maybe the maps on the backs of the brook trout show their ultimate decline—a decline that can't be reversed—but that's not what I choose to believe. There's still something we can do to return this species to their native habitats. Something can always be done if there are still people out there who see the beauty of the brook trout and want to protect it.