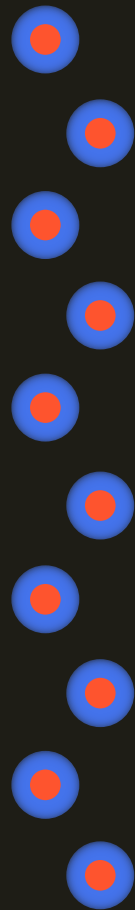


Species Feature



COMMON NAME Brook Trout or Speck	SCIENTIFIC NAME <i>Salvelinus fontinalis</i>
FAMILY Salmonidae (salmon family)	CONSERVATION STATUS Threatened
HABITAT Cool, clear high altitude tributary streams of the Southern Appalachias	
LIFESPAN 5-8 years	FOOD Primarily insects
THREATS Stream acidification, non-native trout, deforestation/warming temperatures	


01	Southern Appalachian Brook Trout
	



Image credit: Derek Wheaton

PHYSICAL CHARACTERISTICS	A bullet-shaped fish rarely exceeding eight inches, the southern brook trout exhibit a distinct red-orange belly and white-edged fins. Their dorsal side is washed in olive tones with a worm-like pattern of lighter shades cutting through. Their flank is adorned in red, blue, and yellow speckles, lending them their regional nickname “speck.”
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IN SUFFICIENTLY FORGOTTEN places, far up the holler, under the shade of hemlocks and hickories, you may find a small fish speckled with gems and a flaming red chest. You join a long line of peoples who have loved this fish, perhaps the first moment you spot one. It is a fish adored by the Indigenous peoples of the Southeast who used it to feed their communities, the mine workers who used them as body-fuel to gain the strength to strike back against the dominant power structure, and the modern angler devoted enough to seek out this increasingly rare animal. This fish, the brook trout (*Salvelinus fontinalis*), is the only native trout species in the Southeastern United States.

Unlike the more popular intruders—like rainbow trout, which come from the *Oncorhynchus* genus of western North America, and brown trout, which belong to genus *Salmo* largely found in Europe—the brook trout comes originally from the northern *Salvelinus* group. They share the genus with other notable species like arctic char and lake trout. It's odd to think of a species that is most closely related to animals that are largely restricted to cold climates as a native resident to the hot and humid Southern Appalachians, but when you begin to dig into their evolutionary history, it makes sense.

BROOK TROUT



RAINBOW TROUT



GLACIAL PAST

During the Wisconsin glaciation, the last major ice age, brook trout took advantage of the cold glacial flows running all the way to the eastern seaboard by becoming **anadromous**, meaning they migrated from salt water to fresh water throughout the year. Jumping from one coastal river to the next, brook trout ranged much farther south than their sibling species. However, as the glaciers began to recede roughly 11,000 years ago, these rivers became too warm, forcing them inland. They chased the freezing glacial meltwaters, following them to higher altitudes and more northern latitudes.

As the ice sheets continued to work their way towards the arctic circle, their flows dissipated, breaking up the once-massive cold-water rivers into smaller, warmer streams. With less continuity of habitat, brook trout were unable to continue migration north and were forced to march even farther upstream. These montane, spring-fed creeks that they found were much less biologically productive and ecologically diverse than the oceans they had previously lived in, forcing them to decrease in size and become dependent on insects as the bulk of their diet.

This evolutionary history creates the next wrinkle in our story. As the glaciers receded and brook trout moved into ever smaller and less connected streams, they

ANADROMOUS Migrating upstream from salt water to fresh water, like salmon do, to spawn.

BROWN TROUT



THE FIVE MAJOR CLADES

- Salters or sea-run brook trout
- Coasters or Great Lakes brook trout
- Upper Mississippi or Driftless Region brook trout
- Southern Appalachian brook trout or specks
- Northern Appalachian brook trout

POTAMODROMOUS

Moving and completing their lifecycle entirely within fresh water

DRIFTLESS REGION

A topographical area in the Midwest bypassed by the last continental glacier

REDD

A brook trout's nest

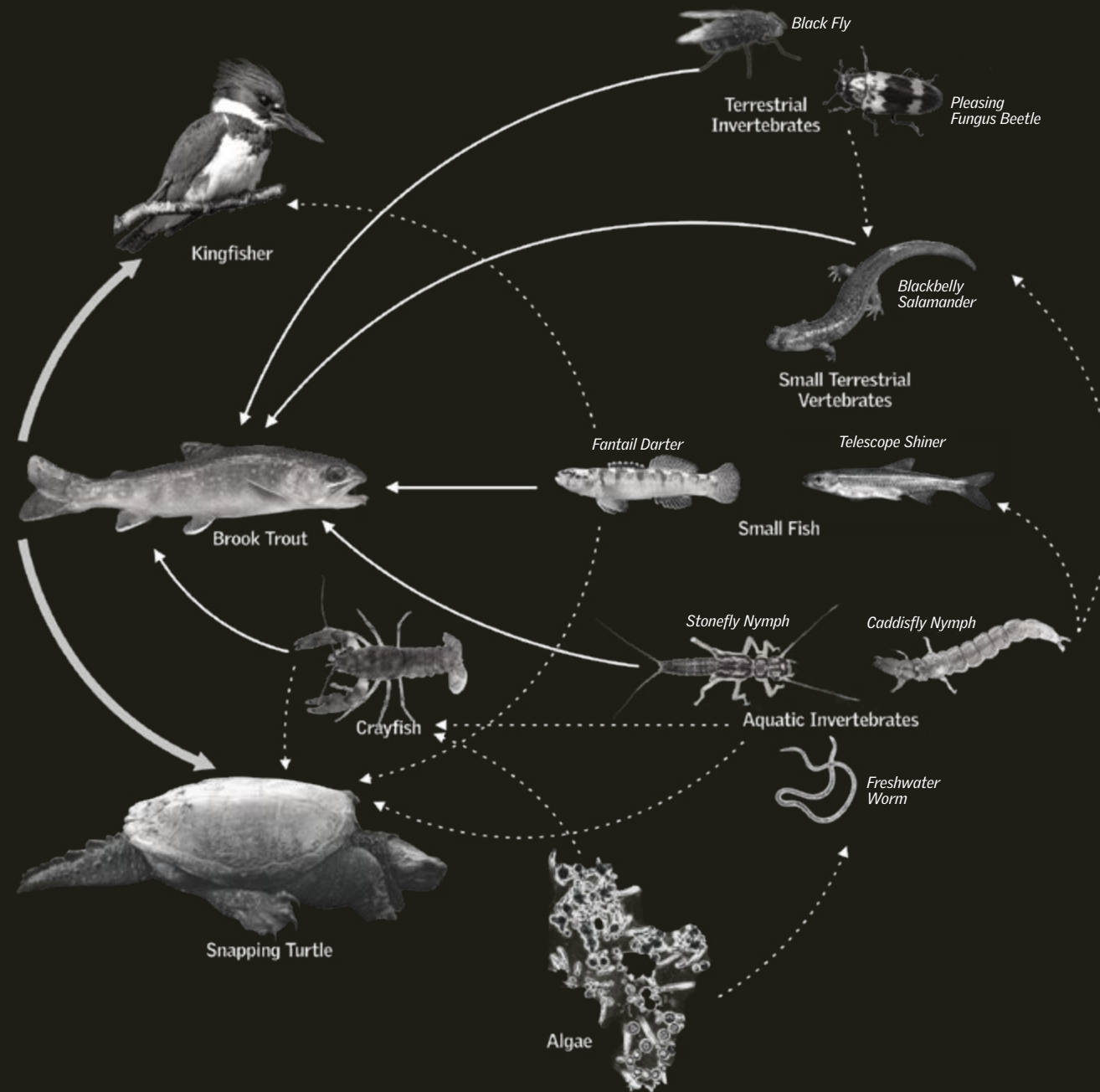
became genetically isolated. This has led to a massive amount of differentiation from one stream to the next, but most people working with these animals try to lump these diverse groups into five major clades. “Salters,” or sea-run brook trout, are found in so-called New England and Canada. They are most reminiscent of the historic brook trout, living anadromously and growing much larger than their landlocked siblings. “Coasters,” the variety found in the Great Lakes, are only slightly more derived from their ancestors. Instead living **potamodromously**, they swapped out the ocean for the lake and the coastal streams for small tributaries.

The Upper Mississippi has its own unique kind of brook trout, although they do not have a special name. They are one of the smallest trout and spend their lives in the unique groundwater-fed meadow streams in between the bluffs of the Driftless Region. This is a small part of the north woods that was spared the ravages of glaciation and served as a refuge for many animals displaced by the pulse of the ice. Then, there is the most well-known and widespread of the brookies, the Northern Appalachian strain. These fish are intermediate in size and able to inhabit larger rivers. Lastly, we have the fish of particular interest to the people of the Southeast, the Southern Appalachian brook trout. This fish rarely exceeds twelve inches in length and

feeds almost exclusively on the insects found in clear, clean, and cool mountain creeks, often small enough to step across.

COLONIZATION & INDUSTRIALIZATION

This particular population has undergone significant range restrictions since European colonization. First, the great forests of the Southeast were clear-cut, warming the waters, creating massive erosion, and scouring the headwaters of their sediments—a crucial component of a brook trout's nest, also known as a *redd*. If that wasn't enough, state and federal wildlife agencies, working with anglers associations, saw an open niche where southern brookie populations were decimated. Instead of working to repair the habitats to give them a chance to recover, they began mass producing the northern strain. This strain was much more tolerant of hatchery conditions and more desirable to sportsmen for their larger size. These fish, in combination with invasive brown and rainbow trout, which were similarly stocked by the same groups for the same reasons, wreaked havoc on these finely balanced ecosystems. All three of these animals are much more reliant on fish as a source of food compared to the native strain, severely reducing the populations of minnows, darters, and daces in smaller waters.



FOOD WEB Neither primary consumers nor apex predators, brook trout are situated at the intersection of a dynamic food web. Like most ecosystems, this food web is built upon algae and other aquatic plants as primary producers. Energy generated through photosynthesis is consumed by primary consumers such as herbivorous aquatic invertebrates. Brook trout feed primarily upon these invertebrates, but will consume smaller vertebrates opportunistically. When young, and sometimes adult size, they do fall prey to predators; including snapping turtles, water snakes, kingfishers, otters, and even larger fish.

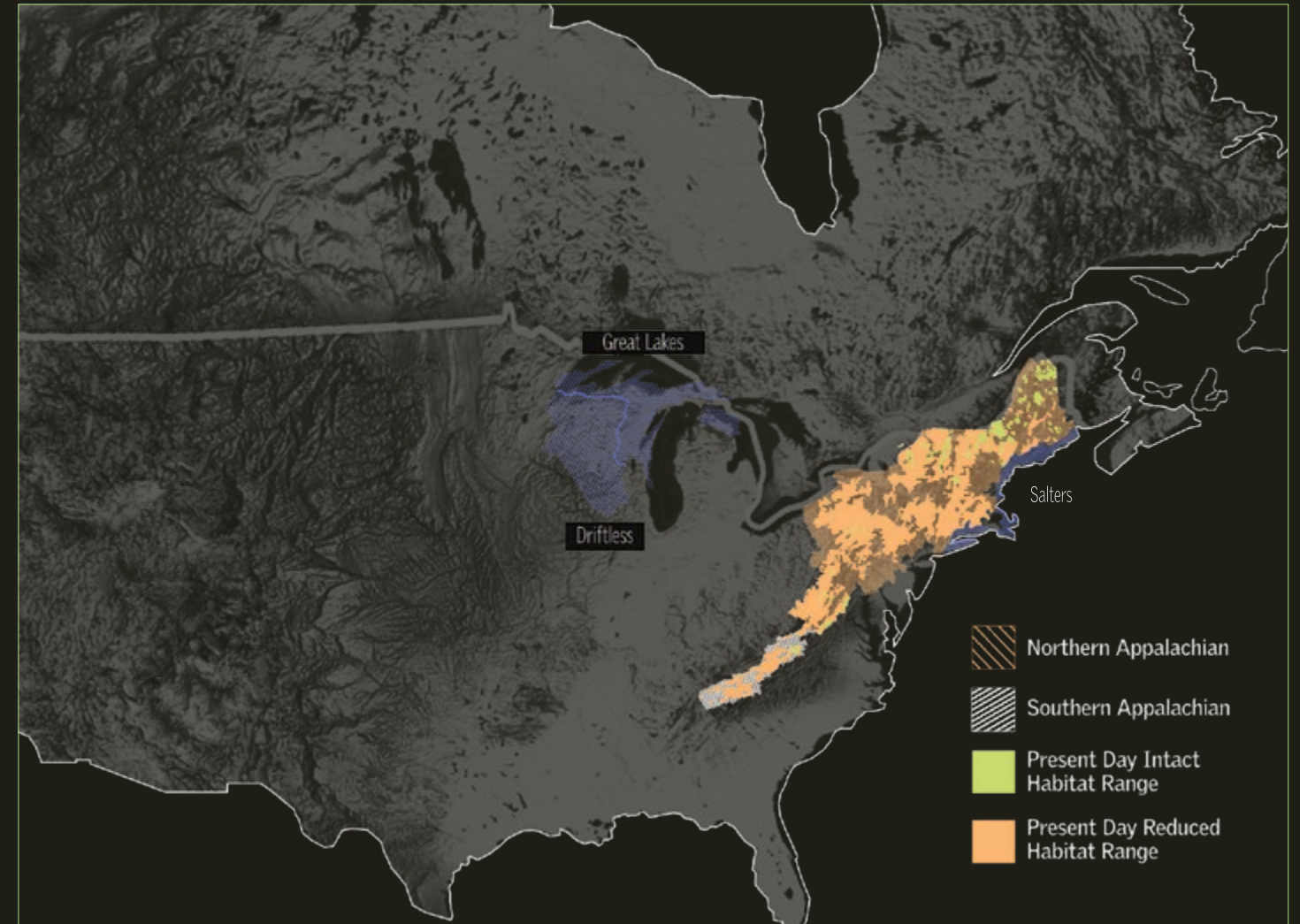
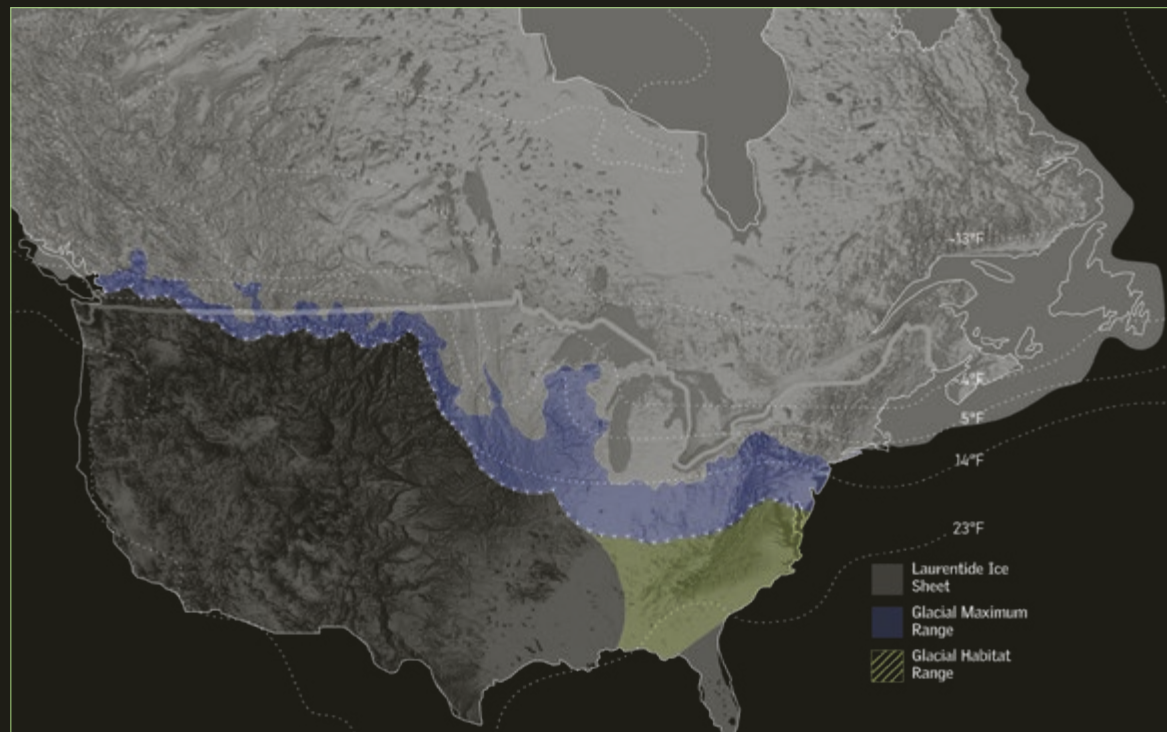


PREGLACIATION

Before the last Ice Age, the ancestors of brook trout existed in waters of the northern hemisphere. This ancestral species would eventually go on to diverge into five distinct subspecies of brook trout following the Ice Age. While exact habitat range is unknown, brook trout would have existed in the area between present day New Jersey and Hudson Bay.



GLACIATION Dropping global temperatures resulted in vast ice sheets traveling south across the North American continent. Deep depressions were carved into the landscape from the sheer mass of glacial movement. Over the course of the Pliocene, the brook trout's habitat range shifted south, following melt water off traveling glaciers.



POSTGLACIATION & COLONIZATION New water bodies were born by receding glaciers' meltwater filling in depressions. These depressions are the direct result of the same glaciers advancing many thousands of years before. Brook trout populations settled into habitats along the Northeastern United States, into Canada where temperatures were still amenable to their needs. Scattered across separate bodies of water, the Brook Trout slowly underwent small divergences resulting in the sub categorizations used today; Upper Mississippi, Great Lakes, Salters, Northern and Southern Appalachian brookies.

Introduction of invasive species combined with habitat destruction has led to decline and fragmentation of brook trout populations. Present day populations have only continued to exist in spring fed mountain streams where temperatures are cooler and oxygen levels higher.



The places that have entirely lost native southern genetics will be left lacking a key part of their ecosystems when the canopy closes in, the waters cool, large foods become less abundant, and the invaders lose their grip.

However, the very things that gave them the advantage in the past will likely come back to hurt them as our forests recover and mature. Although these introduced fishes still persist and reproduce, they are fundamentally unsuited to the unique conditions of montane, old-growth Southern Appalachian woods. The places that have entirely lost native southern genetics will be left lacking a key part of their ecosystems when the canopy closes in, the waters cool, large foods become less abundant, and the invaders lose their grip.

MOUNTAIN LIFE

The story of these fish mirrors many other aspects of the region. Whether it is coal, lumber, culture, or agricultural products, the peoples and resources of the Southeast are routinely exploited and exported for the benefit of those who will never face the consequences of their loss. The final step in this theft is consistently marked by an attempt by the robbers to return a pale imitation of what was taken. It can be seen in the non-native trout swimming in our streams, the microplastics from polyester clothes polluting our drinking water, or the new “Nashville” sound playing through the radio.

Today, several groups are working to restore Southern Appalachian brook trout to their historic range. The Eastern

Band of Cherokee Indians as well as the National Park Service, the United States Forest Service, and several state agencies are focusing on streams with natural or man-made barriers to trout movement in the form of cascades, dams, culverts, and reservoirs. If the habitat is suitable, these groups will work to remove any existing invasive or introduced trout. Once they are certain that the stream is clear, they will go to a healthy population of true southern brookies and collect eggs and sperm from adults during their fall spawn—manually combining them and rearing the tricky larvae in specialized hatcheries. Once they are of a sufficient size, they are released to the stream. Although they can’t immediately replicate the massive genetic diversity of the populations that were once found throughout the Southeast, the hope is that time and natural selection will slowly get us closer to that lost past.

These projects, despite their major importance to the Southeast, receive a fraction of the funding and community support of their western counterparts. Over the last several decades, the salmon and trout along the Pacific Coast have received billions of dollars in conservation funding, and yet there is little to show for it. Many of their populations are restricted from reaching their spawning grounds by large hydroelectric and irrigation dams. Instead of the money going towards the destruction of those walls

of death, it funds teams of trucks and nets, capturing the fish below the impediments, driving them upstream, and dumping them back in the river to complete their fossil-fuel-dependent migration. Then, they lay their eggs and die, rotting on the stream bed as their larvae float downstream and try their best to avoid being ground to a pulp in the turbines.

In a time of imminent ecological and systems collapse, the hubris of this disparity is particularly foul. The moment the gas stops flowing and the trucks stop running, western sea-run salmonid populations will almost entirely collapse. Meanwhile, as long as the forests stand and the streams keep flowing, the brookies left in our temperate rainforest will continue on in the way they had been since the ice left and they first learned the ways of mountain life. ⚡





Photo by Derek Wheaton

