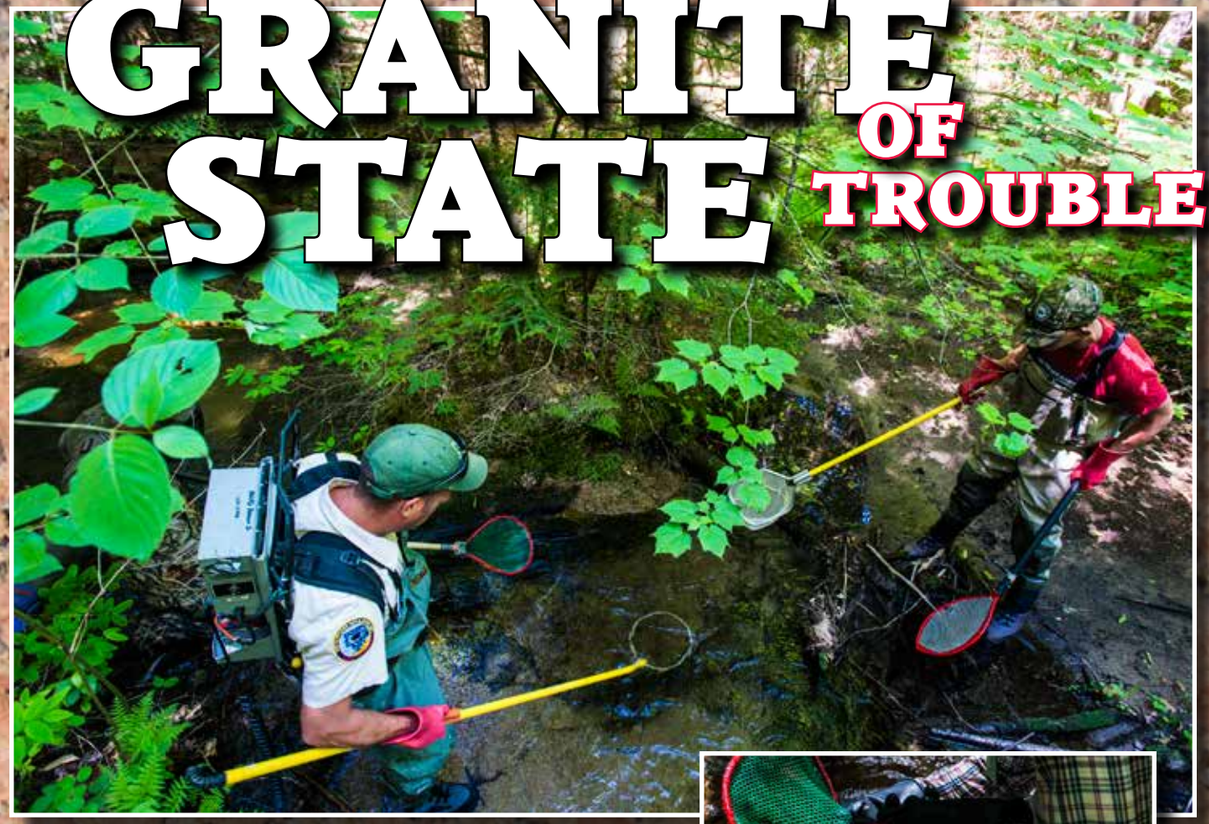
GRANITE STATE OF TROUBLE



Written by Brian Irwin • Photographed by Joe Klementovich

In the early 1800's

New Hampshire's Merrimack River was thronged with Atlantic Salmon. Reports were that runs tallied in the hundreds of thousands of fish, most of them making it all the way to the shallows of the tributaries without hindrance. The river was wild back then, clean and pure and used primarily by the colonist's descendants for fishing and transportation. Yet the dawn of industrial development was rising over New England and in its wake the Merrimack, Connecticut and scores of other Northeastern rivers would be forever altered.

By 1823 merchants from Boston had developed a textile production industry that would lead the nation for decades. They utilized these rivers' power by building a series of dams that would power textile mills, allowing them to produce large quantities in a fraction of the time it previously took. The lucrative nature of this business allowed for an explosion in population size. Cities were built, the population boomed and the waste generated by it all washed into the rivers, pouring in foamy plumes over the dams that were literally destroying the Atlantic salmon habitat.

Henry Thoreau wrote in 1849: "Salmon, shad and alewives were formerly abundant here . . . until the dam . . . and the factories at Lowell, put and end to their migrations hitherward." He went on to say "Perchance, after a few thousand years, if the fishes will be patient and pass their summers elsewhere, nature will have leveled the Lowell factories, and the Grass-ground River run clear again."

By 1870 the Merrimack was so polluted it needed to be filtered. By the 1920s it was swallowing twelve million gallons of sewage daily. The Clean Water Act of 1972 mandated cleanup efforts that were enacted, but even today in cities like Manchester, New Hampshire, the Merrimack is not a flow in which you'd dare take a dip. And the salmon are all but gone.

Recognizing the damage that had been done, the U.S. Fish and Wildlife Service instituted a salmon restoration program. Unlike some of the rivers in neighboring Maine, widespread dam removal was not instituted; rather the dams were updated with fish passages or ladders, hoping that the runs would rebound. A massive stocking program was introduced, where fry and smolt are coddled at hatcheries and released into the headwaters of the river. A similar program was instituted on the Connecticut and Pemigiwasset Rivers, the former of which suffered the same wrath of the industrial revolution as the Merrimack.

And so the program went on for thirty years, with taxpayers footing the bill for this valiant effort to bring back the Atlantic salmon and other anadromous species. The program was expensive to run, but to turn back time it seemed no price tag was too high. According to the Bangor Daily News, the program on the Connecticut River rung up a two-million dollar tab in 2010 alone, when six million fry and 75,000 smolt were released. The cost of the Merrimack's program was high as well, running around $750,000 per year. The problem is that despite the efforts and the massive numbers of fish being stocked, very few were returning.

Advocates of the program lauded it as promising as recently as 2011, when 400 salmon were tallied at the Essex Dam fish lift in Massachusetts. Although 400 salmon is better than no salmon, it became apparent that after thirty years of efforts perhaps it would be reasonable to expect greater numbers. The following year only 137 salmon tagged home base and in 2013, after having invested yet another three-quarters of a million dollars on the Merrimack project alone, a mere twenty-two fish made it to the lift.

The federal government decided to shut down the Connecticut River project in 2012. The following year a decision was made to close the Merrimack program as well, citing "federal budget cuts and stubbornly low annual returns of sea-run Atlantic salmon." Those runs, tragically low, proved once and for all that the river's run has been firmly destroyed by the careless pursuit of growth and goods. And many of the dams that started it all still stand today.

In the tiny pocket water of New Hampshire's White Mountains crisp water bounces over rock gardens on its way to the sea. Many locals drink it right from the stream. Before reaching the sea it will meet the sluggish, thick water of rivers like the Merrimack and the Connecticut, but in the hills it is without pollution and is as clean as the snowmelt that feeds it. And in these streams, Eastern brook trout thrive.

However land use policy has not always protected the Eastern brook trout. Tiny mountain streams follow the natural fall line of the terrain. These avenues proved to be very convenient skidder paths for logs during booming periods of timber harvesting. As trees were dredged through the streams pour-overs and pools were plowed smooth, altering the habitat. As the streams merge into larger bodies of water, paddlers have frequently cut out downed foliage and strainers out of the rivers for safety purposes, effectively destroying some of the most critical habitat for trout seeking protection and cooler water. Without these pools, fewer trout survive through the winter and the overall population suffers.

Tin Mountain Conservation Center is an environmental education facility in New Hampshire's White Mountains. For the last four years they have been systematically instituting habitat enhancement on local first-order streams. Executive Director, Mike Cline, explained that by improving holding zones they have routinely demonstrated a positive impact on Eastern brook trout population.

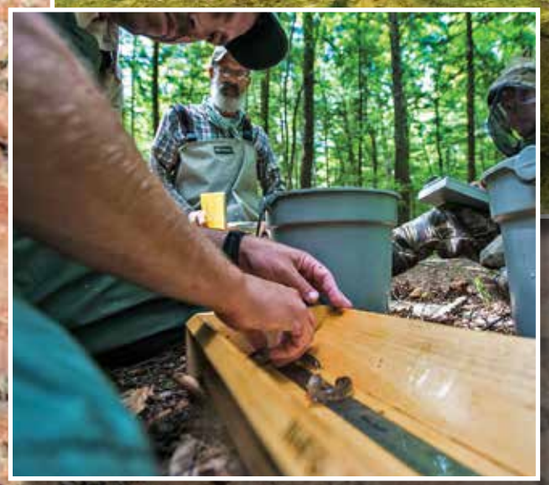
"Our goal is to increase the ratio of pools to riffles," Cline explained. "We improved the habitat on 3,000 to 6,000 feet of stream each year and what we found was positive." He went on to state that through electro-fishing techniques Tin Mountain has been able to track the population size before and after habitat improvement. "We found that the population reliably increased as biomass in the streams increased."

Cline said that "When we looked at the size of fish, they actually decreased after stream treatment, but overall we found more fish. This suggests that treatment of the habitat leads to increased survival rate of younger fish."

Cline's primary technique is the addition of woody debris in the waterways, creating shelter and increasing the number of pools. The use of large woody debris (LWD) in this manner has become an increasingly popular method of improving habitat, and it's been shown to increase fish counts and survival rates substantially. The benefits reach far beyond pool generation. According to a military paper that studied this model in 2000, the placement of LWD has been found to "increase meandering, protect stream banks from erosion and increase sediment capacity." A University of Washington study found that debris deposition was most effective when instituted in smaller streams, although it's important to note that in their work they used manufactured clusters of logs rather than native woody debris.

Despite stocking programs being a pervasive, yet expensive, attempt to restore faltering trout and salmon populations, many programs continue on despite these poor returns. After years of stocking, in 2012 the state of Maine ceased their program on six streams for trout and salmon citing poor holdover numbers and low return rates of salmon.

This is not to say stocking programs haven't been successful. In 2006 the Ontario Federation of Anglers and Hunters began a multi-pronged approach to restoring "a self-sustaining Atlantic salmon population to Lake Ontario." While stocking was part of their approach, the program also focused heavily on habitat improvement, improving water quality and public education. The majority of the work was completed on Duffins



Creek, and they speculate that after 100 habitat enhancements, including fish paths around dams, they are only fifteen years from achieving a self-sustaining fishery.

Maintaining unfettered thoroughfare through waterways has proven to be a very successful way to restore dwindling fisheries. Orvis, for example, has partnered with Trout Unlimited to replace outdated culverts that currently thwart fish from moving up and downstream. This venture aims to "reconnect 1,000 miles of fishable streams by repairing or replacing poorly constructed culverts throughout the U.S."

Many antiquated culverts were built very high on pillars and only serve as an aquatic path during times of very high water. These have become effective blockades to fish movement. One gleaming example of this is New Hampshire's Tabor Brook, part of the Upper Connecticut River, the largest watershed in New England. This brook is a critical spawning habitat for Eastern brook trout and by replacing culverts on this passage, the health of the river system will hopefully be restored to pre-manipulation conditions. As a sign of their commitment to this project, Orvis is matching donations to the end that they'll invest almost $100,000 in this very effective—and cost-effective—way to restore habitat.

The ecosystems we've altered through history are so very complex that to reverse the damage done one must examine and adjust each piece of the environmental puzzle. Stocking programs are rarely effective at achieving sustainable fisheries if executed in a vacuum. Without optimizing the environment for fish we're simply killing young fry and smolt, almost none of whom have a reasonable chance to grow to a reproductive age. Improving habitat through environmental cleanup or the addition of large woody debris, through streamside replanting programs and dam removal appears, to be the lynchpin for success of restoration projects.

Emerald brook trout were not eradicated in small New England streams by logging or human recreation. Rather humans and industry altered the habitat first, the population then in turn dwindled. To merely pump fish into a still-decimated waterway and expect that they will survive is illogical. Only by repairing the habitat will stocked fish have even a fighting chance of thriving and spawning. Perhaps by paying close mind to the data generated in the last twenty years, putting in some old fashioned elbow grease and attacking each spoke of the wheel that we humans drove over our fisheries we can bring back populations that would not otherwise have a chance.

Brian Irwin is a physician from our home town here in New Hampshire, as well as a passionate mountaineer and fly angler. Brian is a frequent contributor to FFA.