



LET THEM EAT FISH

North Carolina's fish commission left a legacy of rainbow trout, carp and the possibilities of artificial propagation.

WRITTEN BY JIM WILSON  ILLUSTRATED BY TIM LEE

"To be universally popular, fish culture must be based on economic or food considerations, and not on those of sport."

—William P. Seal,
Woods Hole [Mass.] aquarist, 1892

North Carolina's first fish commission operated within the Department of Agriculture, created by the General Assembly in 1877. The agency's goal was simple: provide more fish for the state's citizens. To do so, superintendent Stephen G. Worth began a stocking program that was based in large part on planting exotic species of fish, a practice that was common in the 19th century and remained so into the 20th.

The early federal and state fish commissions wanted not only to stock the valuable native species of fish whose numbers had diminished but also to introduce other species, to find something new and better, something that would survive and increase. Across the United States and in Europe, "acclimatization" societies worked to place exotic species of fish and other animals and plants in new yet accommodating locations, a sort of mixing and matching of suitable species and places, at least some of the time.

Thanks to the 1869 completion of the first transcontinental railroad, in the last quarter of the 19th century brook trout and American shad, eastern United States natives, headed west, and rainbow trout and Chinook salmon, native to the Pacific Rim, came east. Brook trout also were sent to England, France and Colombia, black bass went to England, and brown trout, indigenous to Europe, traveled to the United States. Carp from Europe and Asia eventually flooded the country and today are found in every state except Alaska.

Robert R. Stickney, in "Aquaculture in the United States: A Historical Survey" explains the thinking of the period. "[T]here was no thought given to whether introductions of exotic species might be harmful to native flora and fauna—after all, modern ecological theory had yet to be envisioned," he writes. "The life histories of many species had yet to be worked out, so there was little thought given as to whether a particular species might be able to adapt to the habitat into which it was introduced (the fish culturists did, of course, recognize the temperature tolerance limits of cold-water as opposed to warm-water species)."



Too, the idea was in play that the natural world could be fixed, as Stephen Worth put it regarding fish stocking, “aiding their imperfect efforts.” Retired Colorado State University professor, author and noted trout biologist Robert Behnke says that the stocking of Pacific salmon in the West epitomizes that idea. “The large-scale stocking of salmon that began in the late nineteenth century is a classic example of the naïve belief that science and technology can solve all problems and make nature more efficient in serving human society, a belief that seemed to be confirmed by the fact that only 5 to 10 percent of the fish eggs spawned in nature may survive to become emerging fry, while 95 percent survival can be obtained in hatcheries.”

And that is the same argument Worth used in touting the possibilities of artificial propagation of fish, the efficiency of the hatchery over nature. Worth’s arguments stressed the economic benefits North Carolina could derive from stocking fish. There was little consideration given to any species that was not valuable, either economically or as a food source. Thus Worth, in pressing his case for the common carp, wrote: “They will doubtless become abundant in our streams... where the food supply is quite ample to support them in great numbers. The food that horny-heads [chubs] and other worthless fry subsist upon is equally good for the carp.”

It is difficult for most modern fishermen to understand the considerable interest carp aroused in the late 19th century. Considered today an exotic, invasive species at home in eutrophic waters, carp captured the public fancy for a time, due in part to some intensive propaganda efforts from the federal fish commission and in turn the North Carolina commission. “A general interest prevails throughout the State and with careful management of the carp, a great result will follow,” Worth wrote.

Native to the Caspian Sea, common carp spread east into Asia and west into Europe and have been a favorite of aquaculturists, ancient and modern. They enchanted the U.S. Commission of Fish for several decades and were promoted as a food fish, particularly for waters other fish might find unsuitable. Early *Fish Bulletins* published by the federal bureau are replete with carp recipes, and testimonials from satisfied carp growers adorn Worth’s reports. (“Mr. N. W. Thornton, of Elevation, Johnston County, says: ‘With

much pleasure I write to inform you that the German Carp you sent me January the 17th, 1881, are the finest fish I ever saw.’”)

Carp did enjoy a certain vogue for a number of years, as men went about building ponds on their property, stocking the fish and later drawing down the ponds to harvest them. Eventually, some of the ponds flooded and carp escaped into waterways all across North Carolina, as they did throughout the nation.

“Our efforts have gradually been working toward a practical increase of fish as a food supply, and during the past two years we have found no fish so universally adapted to inland wants as the German carp,” Worth wrote in 1883. “In 1880 there were not two dozen fish ponds in the State; to-day there are more than a thousand. All of these ponds have been supplied and there is no doubt we can supply all others for which the fish are asked.”



To meet the demand for carp, the state in 1882 built eight breeding ponds in Raleigh, leased another in that city’s Oakwood Cemetery, and constructed an additional pond on the grounds of the new hatchery in Morganton. Obtaining the fish from the agency was a simple matter. “These fish are given away to all who have ponds uninhabited by other fishes,” Worth wrote. “The fish are sent per express anywhere in the State in a gallon bucket. The person receiving them is requested to pay the express freight and the cost of the bucket, the sum of the two items amounting to about 45 cents.”

By 1885, about 2,000 carp ponds had been built in the state, and 92 of the then 96 counties had received carp. “They will assume a place on the farm that chickens do among fowls, yielding twice the number of pounds afforded by other animals on a like amount of food,” Worth wrote.

This vision, like that for salmon, never materialized. It is said that revenge is a dish best served cold, but carp, at least in the South, is a dish best not served at all. Despite the hoopla, carp never became a popular food source for North Carolinians. As Charles S. Manooch III and Duane Raver Jr. note in their “Fishes of the Southeastern United States,” “Most Southerners will not eat carp, but they are consumed throughout much of the world. The meat may be used to make fish cakes, following the recipe used for salmon, but one should not expect the same results.”

Not until the early 20th century did the federal commission slow its carp efforts. “By that time it was apparent that the now abundant species had limited market appeal and was of little interest to anglers,” writes Theodore Whaley Cart in a history of the federal agency from 1871 to 1940. Today, a small but apparently quite happy legion of fly-fishermen eagerly pursues carp (see “So Happy Carp,” June 2008 WINC). But for most anglers, carp are viewed with varying degrees of disdain, reflecting a belief much like that of 19th-century outdoor writer Frank Forester, who said of carp fishing, “This, I confess, I regard as very miserable sport.”

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Fish culturists, too, began to doubt their advocacy of carp. In the 1906 meeting of the American Fisheries Society, John D. Whish, secretary of the New York Forest, Fish and Game Commission, told an audience: “I have sat in societies and heard gentlemen of eminence confess—I say also, confess very carefully—that the introduction of the carp was a fish-cultural tragedy.”

For recreational anglers, the introduction of California trout—rainbow trout—provided the lasting legacy of the short-lived North Carolina commission. Rainbows, native to the Pacific Rim from Mexico to northern Russia, had been available for stocking from the federal commission only since 1880, when deputy fish commissioner Livingston Stone set up his first trout hatchery on the McCloud River in California. Anders Halverson, in “An Entirely Synthetic Fish: How Rainbow Trout Beguiled America

and Overran the World,” credits the Ornithological and Piscatorial Acclimatizing Society of California with actually being the first to artificially propagate rainbow trout, perhaps as early as 1872. This society sent 500 rainbow eggs to fish culturist Seth Green in New York in 1875, which Halverson says was the first time the species had been shipped out of its native range.

Worth released McCloud River rainbows in North Carolina, 4,300 of them in March 1880, saying that these trout “are similar in many points to the brook trout. The growth of those released in our waters is very encouraging, and there is no risk attending to a successful introduction into our clear streams,” Worth wrote. “They are very choice in quality, of quick movement, taking the fly with eagerness.”

Behnke questions the genetic makeup of these fish. In “About Trout,” the biologist writes that based upon the descriptions of the trout Stone captured in the McCloud River, those fish were both steelheads, a sea-run form of rainbow trout, and redband trout, a more primitive subspecies of rainbows. “The first spawning at the U.S. trout ponds [on the McCloud]

occurred in January 1880,” Behnke writes. “Stone mentions that in December, large, silvery trout up to 10 pounds were taken in the McCloud River. Undoubtedly, these were steelhead. The eggs and sperm of both steelhead and resident redband trout were indiscriminately mixed and the fertilized eggs were shipped out to federal and state hatcheries.”

Whatever the genetics, some of the rainbows sent to North Carolina were planted in private ponds, but 1,000 were placed in both Mill Creek in McDowell County and the Johns River, and 500 each in the Swannanoa River in Buncombe County and Upper Creek in Burke County. Worth himself captured both a landlocked salmon and rainbow trout from Mill Creek in 1881, noting, “We desire no better evidence of their adaptability. They were [at 17 months old] larger than any of a dozen representatives of brook (or mountain) trout taken at the same time.”

And yet, after this successful introduction, the state would stock rainbows only once



PHOTOGRAPHS BY J.E.B. HALL

The Mt. Mitchell Hatchery, located on Neal’s Creek, was once part of the state’s hatchery system. Built in the early 1930s by the Civilian Conservation Corps, the hatchery served as a rearing station for trout.

more, in the following year, when Worth noted, “We released in Mill Creek, John’s River, Linville and other streams, 40,000 Penobscot and Land-locked salmon, and California Trout.” Citing a scarcity of eggs in his report to the legislature as 1882 drew to a close, Worth wrote, “we have paid no attention to them during the year ending at the date of this report.” And the commission would pay no more attention to them for the remainder of its existence.

Although the agency stocked relatively few rainbows, it did take the first step in bringing to the Mountains a fish that would play an increasingly larger role in recreational fishing in the next century. In the years after this commission ceased its work, the federal agency continued sending hundreds of thousands of rainbows, along with brook trout, lake trout, steelhead and finally in 1924 brown trout, to be placed in mountain rivers.

By 1893, *American Angler* magazine touted rainbow trout fishing in North Carolina with a story about fishing the Cullasaja River, in particular a 7-mile stretch of the river that had been stocked with rainbows and brook trout by the Highlands Park Association. The rainbows there, wrote Herbert S. E. Anderson, were thought to reach 6 or 7 pounds. “Besides their attractive appearance and delicious flavor, the California trout are very game and powerful, and make a grand fight for liberty,” Anderson wrote. “A half-pound California will take as long to land as a brook trout double the weight.”

It was in the Coastal Plain where the state commission directed the majority of its work, building two hatcheries for American shad in the Albemarle Sound area and stocking more than 25 million fry during the agency’s history. Ironically, it would be shad that proved the commission’s undoing.

Working with the owners of area fisheries, fish commission workers took the eggs fertilized on the shore to the hatcheries to grow for a few days and then released them into waters up and down the coastline, from the Chowan to the Cape Fear and as far inland as the Yadkin and Catawba. North Carolina’s efforts were supplemented and subsidized by the federal fish commission, which often sent the hatchery ships *Lookout* and *Fish-Hawk* to the Albemarle Sound. The

Fish-Hawk continued working the sound until the national government established a permanent hatchery at Edenton in 1900. It was not uncommon for the United States commission to supply a great number of eggs, for the North Carolina crew was largely inexperienced. As Worth wrote in 1881, “The fact that we had few men of any experience and none fully versed in the work, lent further embarrassment to the situation. . . . Of the force engaged but four had ever seen a young shad, and they were novices.”

The *Lookout* helped with the work in 1879 but was unavailable in the spring of 1880, and Worth was caught short, “without any appliances for collecting or hatching the eggs. It remained for us to fit up for this work, or allow that season to pass and accomplish nothing.” Worth chose to fit up, but only after lengthy discussions by his governing board, which decided to undertake the work. He constructed at Dr. W. R. Capehart’s Avoca Plantation a “plain building,” a single-story structure measuring 20 feet by 30 feet, to house the equipment and men who would attempt to hatch shad eggs. “An engine, two

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steam pumps, and [hatching] cones occupied the main floor, the space between being occupied by the dining table. In the attic hammocks were swung for twenty men. . . . The engine was steamed up on April 14th, and worked twenty-seven days and nights without an hour’s interruption.”

Worth’s force collected more than 10.5 million shad eggs and hatched more than 5.5 million, a total greater than that the experienced federal men had accomplished in each of the two previous seasons, when they had performed most of the work. According to Worth’s calculations, the cost per thousand of released shad amounted to 26 cents. All told, the state agency spent \$3,500 that year, including \$2,500 for new hatcheries.

“We are fairly in harness,” Worth wrote of his men. “Whatever is lacking is due to an absence of more adequate means. . . . We have planted, however, 12 1/2 million fish, and with their return we look for greater

liberality in funds. . . . While some States are spending \$30,000 a year I do not see that our modest efforts are by any means contemptible. With more money we could do more; but with the same amount there are none who do more.”

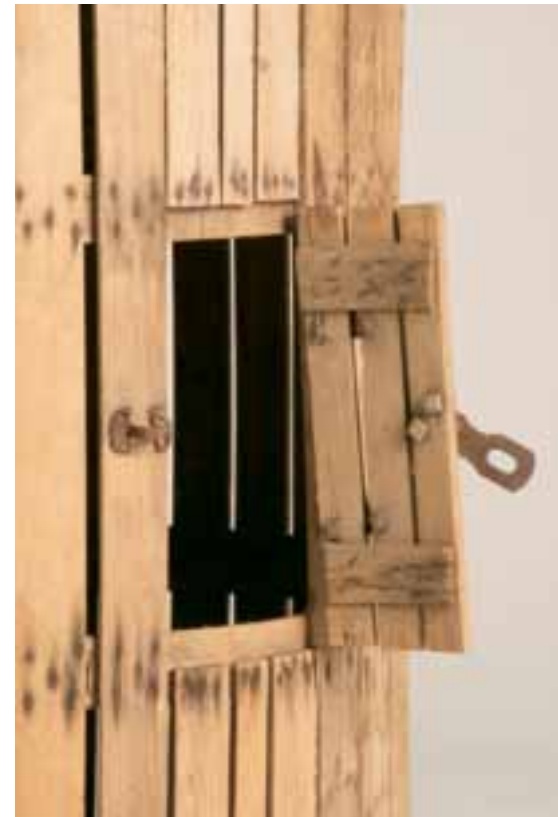
Through 1884, the commission would stock another 12 million shad fry, although it is difficult today to say what effect, if any, the work had on shad populations. Commercial landings of shad in North Carolina peaked in 1897—13 years after the commission ceased stocking fish—at 8.8 million pounds. By 1918, the harvest had fallen to 1.5 million pounds. After a rise to 3.1 million pounds in 1928, shad harvests have trended downward to the point that today the fish is more important to recreational anglers than to commercial fishermen. The federal commission would stock hundreds of millions of shad in North Carolina after the state agency stopped its work but could not alter the steady decline of the species.

The issue of accountability—precisely what the commission *had* accomplished—would doom the agency a few years later.

Worth had recognized this problem in 1881. “As it is, we have no system of statistics, and a very considerable increase may disappear among an increased number of nets and consumers, without attracting special comment,” he wrote of American shad. “If, however,

we maintain the work on a basis of that of last spring, whereby our main streams will get a million fish annually, there will be no need felt for statistics.”

That need, however, did exist, and Worth must have felt it. He included in his reports to the General Assembly anecdotal evidence from shad fishermen of catch increases: a jump from 8,000 shad in 1879 at the Calm Point Fishery 6 miles above Plymouth to 10,000 in 1881, and a rise from 17,225 near Edenton in 1879 to 21,000 in 1882 for J. G. Wood. From the letters he received, Worth figured that “we have made an increase in the rivers with the exception of the Cape Fear.” Worth thought the barricading of the New Inlet might have played some role in the failure of shad to increase in the Cape Fear but attributed most of the blame to “increased fishing, and the exceedingly muddy bottom of that river, where the eggs are dropped.”



This old wooden fish trap from Catawba County would have been similar to those in use in the late 19th century when fish commission superintendent Stephen G. Worth reported that landlocked salmon and rainbow trout had been trapped in the Johns River.



PHOTOGRAPHS BY MELISSA MCGAW/NCWRC

American shad natural history worked against an agency that existed only eight years. Shad spawn in fresh water and return to the ocean for three to five years before finding their natal streams again to spawn. Thus shad stocked in 1881 would not return to the rivers until some time between 1884 and 1886. By the latter date, the commission was effectively gone, as the state's interest had turned from marine fish and freshwater fish to the next big thing, shellfish, and North Carolina had established a shellfish commission.

The end came in 1885, when the Agriculture Department complained to legislators of the money spent annually, about one-quarter of the department's income, on the "hatching of sea fish." The fish commission spent \$10,041 in 1884. "From these large expenditures, continued through so many years, the Board is constrained to say, that there have been no satisfactory results. It is submitted that the propagation of sea fish has been sufficiently tested here, and upon every consideration of prudence, the expenditures for that purpose ought to cease." However, this proposal did not affect the only fish the agency was still stocking. "Carp culture has been carried on with success, and the work in this direction can be expanded to any needful extent with small expense."

In addition, the agriculture board recommended changing a law: "The Board would also recommend the repeal of that part of the said clause relating to 'constructing fishways over dams and other obstructions in the waters of the State.'" To comply with the law, the board said, either the state would have to construct the passages, which would consume the department's income and take many years, or require the dam owners to do so, which the board believed "would be in conflict with one of the fundamental principles of our government, namely, that private property shall not be taken for public use without just compensation."

That is actually what had concerned agriculture commissioner L. L. Polk at the beginning of the fish commission, yet he had reached the conclusion that the public good was best served by requiring the free passage of fish. Polk, however, had left the Department of Agriculture early in the history of the agency, and no real progress ever was made in finding a solution to the dams.

The tangible evidence of the state's first commission is slight—a great many carp



that most anglers don't fish for is perhaps the lone physical trace of that agency's work. And carp are a checkered legacy indeed. Sometimes called the perfect invasive fish because of their ability to live in water other fish cannot tolerate and their prolific spawning, carp also degrade aquatic habitat and consume great amounts of plant material. Thus they bring harm to not only aquatic animals but also other creatures, such as waterfowl, that use the same habitat. In attempting to stock a food fish, the commission unknowingly created a problem that remains with us today.

The true legacy of the commission is intangible, more of mind than of matter, for this agency showed the possibilities of the artificial propagation of fish in North

Carolina, that stocking fish could benefit our state and its citizens. It is an idea that would find fertile ground with another state agency in the next century and reach new heights with the work of the N.C. Wildlife Resources Commission, for whom the stocking of fish remains a crucial element of fisheries management. ♦

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Part Three: June 2011

The rise of modern, consistent hatchery operations throughout the state

AN ARDUOUS QUEST FOR BROOK TROUT

In the summer of 1878, Stephen Worth set off to procure brook trout brood stock for North Carolina's fledgling hatchery operations. The work was arduous and conditions difficult in the Mountains as his party sought suitable specimens of the native brook trout, the only trout in North Carolina waters at the time (although in truth the brookie is a char and not a trout). The following paragraphs are excerpts from Worth's report of the expedition.

"After earnest entreaty on my part, it was agreed last June that I should be allowed to collect as cheaply as possible some of our fine brook trout—yet abundant in our most retired western streams for spawn taking purposes. Accordingly I spent several weeks in some of the wildest mountain gorges of the State. In the more settled portions they have become scarce and some of the finest procured were carried from the headwaters of the Tow [sic] River at the base of Mitchell's peak directly up the side of the Blue Ridge within three hundred yards of the Pinnacle.

"I was accompanied by a small party and we relieved each other by turns. These fish we carried on our shoulders four miles up the Ridge and three miles down, accomplishing a trip in ten hours and thirty minutes. On an average the water was renewed every seven minutes and when it is remembered that we had to wade the streams and follow a course that only men reared in those mountains could follow, it may well be realized that in conjunction with the highest summer heat ever known there, that the undertaking was of a severe nature.

"Owing to the streams being 'fished out' at so late a season as July 3rd and the fish being scarce, and the high summer heat and slow transit over the rocky and in many places nearly impassable roads, I could not get any vast number, of those I did get, many were lost through the last mentioned agencies. I secured over 2,000 fish, but from deaths from various causes, including injuries in the brain from the hook, they only numbered 1,400 in September."

Worth took eggs from these brook trout on Oct. 29, 1878. He obtained about 10,000, but then "the fish became so wild that they would no longer enter the spawning races, and I was obliged to stop. It was not advisable to net them owing to the fact that the Salmon from California were hatched in the house below, and I deemed it unsafe to stir up the bottom and send down an epidemic-producing volume of impure gases which had formed from waste meats in feeding the trout previously."

Writing in the spring of 1879, Worth reported that the eggs he did collect successfully hatched, along with 40,000 of the 50,000 brook trout eggs purchased from New Hampshire. Although Worth does not say so, it is a reasonable assumption that the commission's first and only stocking of brook trout, in March 1879, comprised both native fish and those from New Hampshire, thus marking the first time a non-native strain of brook trout appeared in North Carolina streams.

As unseasonably hot as the summer had been, Worth and his men encountered more miserable weather in winter at the temporary hatchery at Swannanoa Gap, situated at an elevation of about 2,600 feet near the Eastern Continental Divide. "Our hatching house building is of the most inferior quality, but was constructed for experimental work and has answered all purposes so; but as nothing but running *branch* water is used, its temperature is so reduced in cold weather as to freeze solid in troughs, house and ponds without incessant labor night and day while the cold spells prevail. The troughs, reservoir and supply troughs are common and leaky and the ice formed eighteen inches thick on our entire floor, even encroaching on our office, freezing six inches thick and remaining a *month* in the bunks made for our sleeping accommodation, and within four feet of a stove in which a fire burned night and day for weeks. I respectfully recommend that we may have a new building."

And indeed the commission did construct a new and much better building, but not at Swannanoa Gap. The state instead built a hatchery in Morganton, on the grounds of the state asylum there, in the summer of 1879.

"Since fish culture is destined to become an important factor in the political economy of our people, the educational facilities offered by the State hatcheries are of great benefit," he wrote. "The publicity of this location attracts a large number who otherwise could not visit it. Of about three thousand who have seen the hatching in operation, only about three have expressed a disbelief in the success of the work."



—Jim Wilson