



FRANKENFISH

BY TED WILLIAMS

BY MIXING AND MANIPULATING FISH GENES, HUMANS CAN MAKE ALL MANNER OF WEIRD CREATURES THAT DON'T EXIST IN NATURE. BUT JUST BECAUSE WE CAN, DOESN'T MEAN WE SHOULD.

For a large element of the public, fish don't count as wildlife. Their value is seen more as benders of rods than pillars of native ecosystems. That's why mongrels and mutants concocted in hatcheries are so popular.

I'll grant that some of these "Frankenfish" have management functions. Most tend to be sterile and therefore are unlikely to interbreed with or overwhelm wild populations. So they can occasionally be used to control invasive fish, mussels, snails and vegetation. A few utilize habitat unavailable to either parent. Most notable among these are the hugely popular "wiper" (produced by crossing freshwater white bass with anadromous striped bass) and the equally popular "splake" (produced by crossing brook trout, AKA "speckled trout," with lake trout).

MUTANT RAINBOWS

But what are we to make of Frankenfish production that has no purpose other than to provide license buyers with something bizarre and unnatural? Consider “palomino trout,” also called “golden rainbows.” They’re mass produced and heavily stocked throughout the U.S. and Canada. In 1955 a mutant, pigment-bereft female rainbow (not an albino) turned up in a West Virginia hatchery. So impressed were managers with her banana-hued flanks that they reared her in a separate tank, fertilizing her eggs with milt from normal males and selecting blond fry. By 1963 there were enough golden rainbows to start stocking. Soon they were being exported to other states and provinces. Despite West Virginia’s 500 miles of native brook trout stream, which it manages superbly, it’s the golden rainbow (whose pigmented ancestors evolved in the Pacific Northwest) that adorns the Wildlife Division’s logo.

TRIPLOIDS

Triploidy, a mutation that produces three rather than two sets of chromosomes, is rare in nature. Human triploids have multiple birth defects and rarely live more than a few days. Triploid fish are equally rare unless they’re created in hatcheries by exposing eggs to heat, pressure or chemicals, in which case they’re ubiquitous. Throughout the U.S. and Canada triploid fish are all the rage. They do serve a management function because they’re almost always sterile and generally incapable of spreading hatchery genes to wild fish. But the popularity of triploids is more a function of enormous size resulting from energy flowing to growth rather than gonads. Some wild-fish advocates (me, for instance) find them grotesquely obese.

When I contacted the owner of a California trout farm who charges the public to fish in his triploid-stocked ponds he declined to be interviewed, noting that his trust in the media departed after the *Los Angeles Times* entitled a recent piece about his operation “Freakoid Fish.” Before he hung up, however, he informed me that he had rainbow trout “much larger” than the state record.

In the January 2009 *Field & Stream* John Merwin offered this lament: “The next giant largemouth bass or rainbow trout we hear about may well deserve an even bigger asterisk than Barry Bond’s home-run record.... Caught in the middle is the International Game Fish Association, the slow-to-change organization that has been certifying record catches since the 1930s. Current IGFA rules...fail to account for some genetically altered [triploid] fish.”

Merwin’s words were prophetic. Eight months later a new all-tackle world record rainbow trout was recognized by IGFA—a flabby, melon-shaped triploid weighing 48 pounds that had escaped from an aquaculture operation on Saskatchewan’s Lake Diefenbaker. IGFA still recognizes triploids, explaining that collecting and examining tissue from record-book submissions would be difficult.

When triploidy was new, fisheries managers were hopeful that sterility of the mutants would safeguard

Atlantic salmon and other natives from genetic pollution. For example, in 2002 *The New York Times* quoted Dr. Fred Whoriskey (then of the Atlantic Salmon Federation) as follows: “[Triploidy] could be a win-win scenario in that taking the genetic, reproductive component in farm fish out of the picture in a cost-effective way would really protect wild fish, while having just a negligible effect on the salmon farming industry.”



A palomino trout, or golden rainbow, a mutant species. Facing page: a “wiper,” which is created by crossing a freshwater white bass with a striped bass.

It wasn’t long, however, before managers learned that triploidy leads to arrested gill development, skeletal deformities, diminished immunity and, accordingly, heavy predation. Recovery of triploid Atlantic salmon after ocean migration proved to be between 12 and 24 percent of that for their normal siblings.

Whoriskey’s optimism had taken wing by 2010 when I caught up with him at Dalhousie University, where he directs the Ocean Tracking Network. He told me this: “It turns out that triploidy has a number of other nefarious effects beyond making fish ugly. One is suppressing the immune system, so triploid animals become much more susceptible to infection with a variety of diseases. From a

fish farmer's perspective, you either lose fish or depend on much higher medication use, which gets you into environmental trouble as well as cost trouble. And from a wild-salmon perspective it means that the triploid fish become incubation factories for various disease organisms that will be shed into the water and potentially move into wild stocks."



LEN HARRIS



PHOTO BY RICK ARNOLD, COURTESY OF TROPHYTROUTGUIDE.COM

A 43-pound, 10-ounce triploid rainbow trout taken in Saskatchewan's Lake Diefenbaker by Adam Konrad (above). The International Game Fish Association recognized it as the all-tackle world record until 2009 when Adam's twin brother, Sean, caught the new and current world record in the same lake, a 48-pound triploid. You have to admire the unpretentiousness of these young anglers. Adam described his fish to the press as "ugly and fat;" Sean called his "a freak." Top, a tiger trout.

SPLAKE

Maine has more and larger native brook trout than all other U.S. states combined, yet it commits major resources to crossing brook trout with lake trout. In its literature, the Maine Department of Inland Fisheries and Wildlife (MDIFW) correctly notes that splake occupy habitat unavailable to either parent. But splake prey so heavily on brook trout that these man-made mongrels are used as a biological control for the stunted, non-native brook trout that infest lakes in the American West.

And splake wander. Now they're showing up in Maine's best brook trout and landlocked salmon rivers, including the Rapid, Magalloway, Dead, Kennebec, Sebobeis and Penobscot. MDIFW also correctly notes that splake are easy to catch, but then asserts that they therefore provide "a better return on the sportsman's dollar." Not all sportsmen measure "return" by ease of obtaining quarry. The Sportsman's Alliance of Maine, for instance, has a long history of opposing the splake program. And outdoor writer Bob Mallard, the state's most energetic and outspoken native-fish activist, calls splake in brook-trout water "the hair in a hundred-dollar meal."

"Splake are sterile," proclaims MDIFW. "Reproduction has never been documented outside of the hatchery environment." That may be true for Maine, but lack of documentation doesn't mean lack of reproduction. In the Great Lakes splake have long been seen not only to reproduce but also to transfer their warped genes to two natives—lake trout and an imperiled race of giant brook trout called "coasters." In one sample of 15 alleged splake caught in Lake Superior, two turned out to be splake/lake trout hybrids; two splake/coaster hybrids; and one the result of a splake mating with a splake. What's more, splake so closely resemble coasters that U.S. and Canadian anglers kill the latter, thinking they're the former. A Michigan judge tossed out the citation of an angler who had illegally retained a coaster on grounds that any reasonable person would have thought it was a splake.

Wisconsin and Michigan still stock splake in Lake Superior, a fact Michigan fisheries biologist Ed Baker calls "unfortunate." He worries about competition, predation and genetic contamination suffered by lake trout and coasters. When I asked him why his state dumps splake on top of these natives he said: "Because anglers want them. My sense is that they don't want to restore coasters if it means they might lose their splake fishery."

SAMBROS

There are natural, albeit rare, hybrids of Atlantic salmon and brown trout. But while these "sambros" doubtless occur in the wild on this continent, they're not "natural" because brown trout are alien to the New World. Over the years, sambros have been whipped up here and there in North American hatcheries for the amusement of anglers. They've never caught on, however, at least in part because the migratory salmon genes make them wander.

But in 2013, researchers from the Memorial University of Newfoundland created sambros for another reason. They crossed brown trout with genetically modified Atlantic salmon that had been infused with genes of Chinook salmon and ocean pout. Some of the resulting sambros grew faster than even the fast-growing genetically modified salmon. And in a simulated stream environment they outcompeted normal Atlantic salmon, reducing their growth rate by 54 percent. The experiment exposed the dangers of escaped Frankenfish. As the researchers noted,

if such transgenic hybrids were to arise in the wild they “could detrimentally affect wild salmon populations.”

AquaBounty, the company from which the researchers obtained the genetically modified salmon, countered by pointing out that the fish it intended to market would be triploids and therefore unlikely to reproduce in the wild. But other Frankenfish come with other dangers. Splake, for example, threaten wild salmonids for reasons stated above. And it turns out that wipers have viable gonads, will migrate upstream with spawning white bass and striped bass and—on occasion—apparently backcross with both, polluting habitat with nasty intergrades.

Considering the fragility caused by triploidy, it’s not a good bet that genetically modified Atlantic salmon from other companies will be triploids or that AquaBounty fish will always be triploids. And the fact that AquaBounty fish (now approved for sale in the U.S. and Canada) are currently triploids is hardly reassuring to advocates of wild salmon and trout because, as Whoriskey notes, triploids are disease factories.

TIGER TROUT

“Tiger trout” are fashioned by crossing not just species but genera. They’re aggressive and sterile hybrids of North American brook trout (char, not trout) and European brown trout (true trout). They, too, can have a management function. In June 2016, the Oregon Department of Fish and Wildlife released 18,000 in Diamond Lake in hope of eradicating invasive tui chubs that survived treatments with the fish poison rotenone.

But for every water like Diamond Lake there are hundreds where the sole purpose of tiger trout is to titillate ecologically challenged license buyers. Google “tiger trout” and, discounting a few of my own comments in *Fly Rod & Reel* magazine, all you’ll find are accolades about their alleged “beauty.” There are plenty of outdoor writers for whom participation in nature is central to their fishing and who don’t equate garish, unnatural coloration with beauty. They don’t write about tiger trout.

MORE GENETIC COCKTAILS

Other Frankenfish include but aren’t limited to: the “meanmouth bass” (a smallmouth/largemouth hybrid that fell out of fashion because hybrid vigor rendered it so aggressive it attacked and bit canine and human swimmers, sometimes drawing blood); “saugeye” (sauger/walleye); “tiger musky” (muskellunge/pike); “rainchen” (rainbow trout/huchen); “brownbow” (brown trout/rainbow trout); and true albino rainbow trout that show up like neon lights and are stocked with pigmented fish to assure luckless anglers that the hatchery truck really hasn’t passed them by.

I don’t think people who target and demand Frankenfish are unethical. I do think they should be encouraged to acquire what George Bird Grinnell, editor of the old sporting weekly *Forest & Stream*, called “a



LOUIS CAHILL

A muskellunge/pike cross, the tiger musky.

refined taste in natural objects.” That’s the unfinished, often unattempted job for information and education officers of state and provincial game and fish agencies. When these agencies juggle fish genes merely or mostly to shake down license dollars, I think there is an ethics issue.

As an information and education officer for the Massachusetts Division of Fisheries and Wildlife in the 1970s, I learned that managers can create a demand for anything unnatural merely by providing it. We stocked Kokanee salmon from the Northwest and imported varying hares from New Brunswick. Our sister agency, the Massachusetts Division of Marine Fisheries, even superimposed coho salmon on Atlantic salmon habitat.

Maybe Kurt Beardslee, director of the Duvall, Washington-based Wild Fish Conservancy, says it best: “We have to make up our minds. Do we want a circus environment with bizarre creatures to amuse us? Or do we want to restore healthy ecosystems?” 🐟

A member of the *Journal’s* editorial board, Ted Williams writes the monthly “Recovery” column for The Nature Conservancy’s *Cool Green Science* (<http://blog.nature.org/science/profiles/ted-williams/>) and serves as Conservation Editor for *Fly Rod & Reel* magazine.