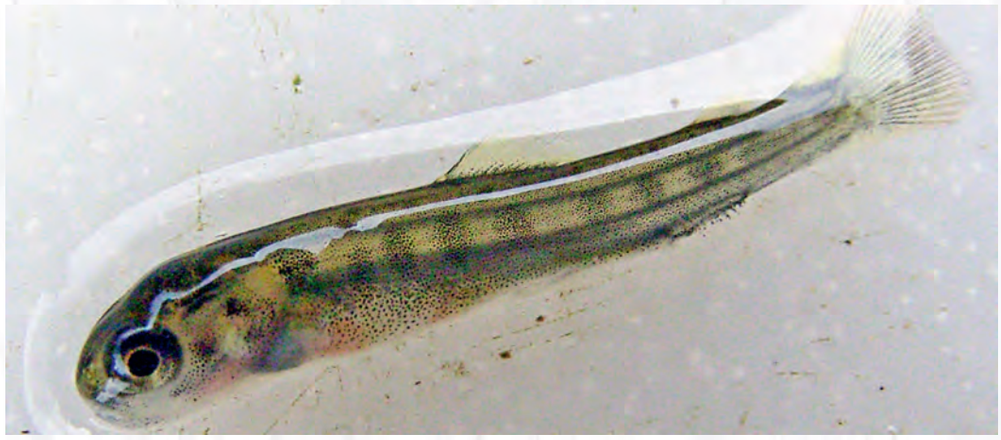
Trout Talk

LET THEM GET ON WITH IT

Stripping wild broodstock and rearing the resultant fry is no guarantee of maintaining a healthy trout population, says *Paul Gaskell* of the Wild Trout Trust. In most instances the fish really do know best...

CHRIS AVERY WTT



April fry from a streamside incubator, or "eggbox". Early mortality rates can be high in such systems.

A RURAL scene as winter proper sets in after Christmas: the faithful keeper of the stream diligently catching and stripping ripe wild fish of their eggs and milt, the little orange eggs placed lovingly in the incubation box, the black ribbons of baby fish entering the trout stream in March – destined to come to the fly of a lucky angler in the years to come.

Lovely images and, at first sight, seemingly the ideal way to boost the opportunity to fish for the trout (or, dare I say, salmon?) derived from your stream. Surprising, then, that in many cases the fishing may not improve much as a result of such efforts. How can this possibly be? Especially after all that work!

In fact, there is a long list of opportunities for this process to go astray. Just a small selection of pitfalls is considered here. The very first hurdle is apparent when we ask: "What would have happened if the broodstock were left to breed in the stream?"

The simplest account would be to say that they would obey their breeding urges as they came into full condition to mate. This involves making their way to the spawning grounds and selecting their ideal site and the ideal fish to pair up with. Each fish is genetically predisposed to choose the mate and breeding spot that gives the best chances for their offspring to thrive.

It is amazing to learn that fish actively choose their mates on the basis of all kinds of obscure characteristics – including those invisible to humans (such as smell and even the underlying compatibility of their genes). Even more amazing, those choices have been measured to result in increases in resistance to disease and increased survival in their offspring. The result is a generation of fish that are well equipped to survive and thrive in the stream of their birth.

What changes with human intervention? One of the most practically demanding problems is that when you capture broodfish, they are not all ready to breed at the same time. Therefore, fish must be kept in captivity until they are ripe. Most wild fish fare very poorly in captivity and the mortality rate is high. Death of broodstock also means losing the breeding contribution that those fish would have made if left in the stream. The surviving fish will be artificially selected as the ones that cope well with captivity – whilst breeding lines that are well adapted to "living wild" are lost.

To compound this, the element of choice exercised by the fish in the stream is also removed because the eggs and milt are combined by human hand. Scientists know some of the

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cues used by fish to choose their optimal mate to produce the best offspring. However, none of that compatibility (*eg* complementary immune systems) can currently be assessed or used to guide artificial breeding pairings. As a result, genetic studies on fish bred from all wild brood stock on the River Dart showed that first generation offspring of wild brood stock were clearly genetically different from any of the wild populations present in the river system. In fact, studies find that even when every effort is made to ensure completely random mating in captivity, we humans are not capable of avoiding biasing the results. We can't make the optimum choices that the fish make themselves based on sensing their potential partner's genetic compatibility! Moreover, the sheer numbers of broodstock that would be required to prevent inbreeding is a substantial loss to in-stream production where wild fish are present.

Okay, but surely more eggs will hatch in captivity and more fry will be put into the stream? Well, yes, if the conditions can be maintained (a labour-intensive task), the hatching rate will be much higher than that achieved in-stream. But this rate is not guaranteed. For example, in wild broodstock schemes where streamside incubators (called "eggboxes" or "Jacuzzis") are used. Suffocation of the gravels in the incubator can wipe out a whole year's batch of eggs.

The bigger problem, though, comes from assuming that more fry equals more adult fish in the following years. Where this has been measured, the survival of fish in the stream derived from eggboxes can be poor and make little contribution to anglers' catches. Studies on trout and salmon have shown that the artificial selection and early rearing process can significantly hamper our precious fry (*eg* through reducing their opportunity to learn to forage or avoid predation). These effects can occur within the very first generation of fry produced from artificially mated wild broodstock. In other words, fry produced in captivity from wild parents are likely to be at a disadvantage compared to stream-bred fish.

Furthermore, if the bottleneck on your river is a lack of suitable cover for fry and parr, putting more fry into the system just means more fry will die.

So, when might it be the best option to try a wild broodstock scheme? In truth, very seldom. The weighing of various "interventions" may be appropriate, for example, where all access to spawning grounds is lost by the installation of impassable barriers or drowned out by reservoir construction. General guidance is hard to provide, though – and assessment on a case-by-case basis is always required.

Restoration of a population lost to catastrophic changes to habitat or water quality would always require that any habitat bottlenecks are tackled – irrespective of how populations are re-started. We then have to think very hard whether wild broodstock schemes have any advantage over seeding with wild juvenile fish from a neighbouring stream (which would avoid the domestication effects of artificial breeding). Don't forget how much work wild broodstock schemes inevitably involve – and there is also the difficulty of locating someone willing to donate the use of their own precious wild brood fish.

Eggbox scheme in operation on the Willow Brook.

Fry caught – and killed – in the mesh of an eggbox overflow filter.

"The survival of fish derived from eggboxes can be poor and make little contribution to catches"

Another potentially suitable candidate scenario is in groundwater-fed streams that dry up in the upper reaches – trapping and killing adult fish as the last puddles disappear. Even in this scenario, the difficulties of such a rescue are immense as WTT Trustee and S&TA stalwart Peter Hayes can tell you – because it happened to him and Peter is not one to shy away from Herculean efforts…

PETER'S ACCOUNT

"We, the Wilton Fly Fishing Club on the lower Wylye, have a similar bottleneck to our friends and colleagues the Services Dry Fly Fishing Association on the Avon in the next-door valley. Our objective is to provide excellent fishing for wild trout in our two lovely chalkstreams.

Our problem has been main river spawning gravels concreted with calcium tufa and liberally larded with silt. The malaise was accurately diagnosed on both rivers in the 1960s by Frank Sawyer, whose solution was to seed with swim-up fry (hatched fry that have absorbed their yolk sac) in excess of 100,000 for each river (the fishing being about seven miles in each case). On the Wylye, there was also the opportunity to introduce wild adult fish trapped in periodically drying (winterbourne) tributaries – and on the Avon, adult fish reared from originally wild, but farmed stock. On both rivers, trout parr in their first and second year were shown by research in the 1970s to be seeding themselves into the main stems out of the winterbournes at the rate of 2-4,000 a year. Thousands sounds like a lot, but only a few tens would survive to takeable size, so supplementary stocking was still indicated for both rivers.

And ten years ago stocking with swim-up fry was what we believed to be the least-damaging option and the one most likely to provide us with adult fish that were fit for the river. The simple reason for this is survival of the fittest – natural selection would ensure that the most well-suited fish would survive from the 100,000 that we would introduce and go on to reproduce. This would apply even if non-native fry were introduced; but how much better would it be if the fry could come from native wild broodstock!

So we were delighted that, partly as a result of arguing our case to the Environment Agency, the Trout and Grayling Strategy allowed for the careful implementation of wild broodstock schemes in appropriate circumstances. We (the WFFC and the Services Dry Fly Fishing Association on the Avon) were able to argue to the EA that ours were appropriate circumstances.

Already in preparation for this the WFFC had been rescuing stranded fish from our winterbournes with the generous help of Wessex Water staff, and we had been sending them to a fish farm in Dorset to see if we could bring them on for stripping. This had only been partially successful, with many fish refusing to eat and also declining to come into spawning condition. We put this down to the extreme purity of the spring water used in the farm – we guessed that the fish thought it wasn't organic enough for there to be anything to eat for their fry and hence declined to produce any. (Post-hoc rationalisation is the bane of all those with exciting ideas, and tends to run hand in glove with hindsight).

So when we got together with the SDFFA to produce our plans for the Joint Wild Broodstock Scheme, we switched the relocation and rearing of rescued wild broodstock to the SDFFA's rearing facility at Haxton, Netheravon (Frank Sawyer's old broodstock ponds).

So what did the rescued fish do at Haxton? Much the same as they had done in Dorset! Refused to eat; declined to come into spawning condition; went into a decline; escaped, and so on. In the end they became the "Desaparacidos" of the chalkstreams, and only a few weeks ago when we went with worms and maggots to fish out the survivors after two years of unsuccessful trial we found less than a dozen out of 750 big adult fish, some of which had been almost in double figures.

We got a few thousand eggs and very high fry survival the first year but almost none the second. We had also got a few thousand eggs from the Dorset experiment, enough to make minor supportive stockings but no more. So we have now brought the Joint Wild Broodstock Scheme to an end. We did learn a lot, and we hope the experience will help others – if only to be cautious!

To be honest we now believe that it is the removal of potential stock fish from their natal river that is the problem. They are programmed to return to spawn in their natal water and if they can't smell it they won't come into spawning condition. If we had been able to install broodstock ponds on the lower reaches of the winterbournes, I believe that we could have succeeded. And if we had, then with the genes still local and the help of natural selection we might not have fallen foul of the farm selectivity pitfall. (A report has been produced by SDFFA and WFFC and may be available to serious readers!)

We and the WTT are of similar mind, that it is better to take all steps to get rid of bottlenecks caused by poor spawning conditions in the gravel by restoration techniques aimed at re-energising the river and making the gravel self-cleaning.

The specific nearby creation of trout-friendly fry, parr, and yearling habitat will make a big contribution to increased survival to adulthood. And bringing back into "production" small tributaries and sidestreams which have dropped out of spawning use by the trout will also, if gradually, increase the natural growth of the existing wild population."

● For free advice, contact the Wild Trout Trust. Tel: 023 9257 0985. Web: www.wildtrout.org

Success: a plump wild fish that has benefited from habitat improvements.

CHECKLIST

- Investigate potential to create and maintain spawning habitat (and juvenile and adult habitat)
- Consider stocking (sterile) adult fish to support angling on rivers that cannot produce their own trout
- Think hard (and get professional and regulatory advice) to find out if a wild broodstock scheme is the best answer for your fishery
- Be prepared that wild broodstock schemes will be incredibly hard work
- Acknowledge that a lack of mate choice and artificial spawning environment will produce fish different from wild fish spawned in-stream
- Consider wild parr seeding as a means of re-establishing lost populations (once habitat and water-quality problems have been addressed!)

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