TROUT STOCKING – where do we go from here?

Andy Thomas explores the pros and cons of using wild broodstock as an alternative to stocking with farm-reared trout.

The Wild Trout Trust is a practical group of enthusiasts that strives for the improvement of wild trout stocks through the protection and improvement of their habitat. That's what we do and we largely stick to our knitting. As a group who daily give advice and support to large numbers of fishery owners, angling clubs and individuals with an interest in trout, we obviously have a view on a wide range of issues. Water abstraction, predation pressures, diffuse and point source pollution, as well as actions taken under the fisheries management banner are just a few of the topics we are routinely confronted with. Trout stocking (and its effects on wild fish) is one that crops up time and time again. Just to nail our colours to the mast, the WTT position is that compelling scientific evidence suggests that stocking fertile domesticated strains of trout into rivers, streams and lakes is harmful to wild stocks and that science just cannot be ignored.

You must have been doing all your fishing in the former Soviet Republic of Tyrgyzstan if you haven't heard about the changes in stocking policy proposed under the Environment Agency's Trout and Grayling Fisheries Strategy. For those of you who have not heard about it, you might be surprised to learn that from 2015 all brown trout stocked into fisheries with wild trout stocks in England and Wales will have to be either all-female triploid (sterile), or fish derived from local wild broodstock produced under a suitable rearing regime. At the time of writing, the EA have yet to publish guidance on what will and won't be acceptable for wild broodstock programmes but I'm told that there will be an element of local decision making which seems like a sensible way forward. There will be conditions attached to programmes which will protect wild stocks and ensure that any stock produced is fit for purpose. From my travels and discussions with clubs it seems that many believe that wild broodstock schemes are potentially the answer to their prayers. But before we all get too excited let's just explore the options.

Over the last few years we have debated the issues concerning the definitions of wild and native fish, loss of genetic diversity and fitness, natural selection processes, the use of sterile fish and a myriad of other stocking related topics. I'm sure we will continue to do so as further research is carried out, but we now need to make some tough decisions about how our fisheries are to be managed in the lead up to and beyond 2015. Where does the policy leave the fishing clubs or syndicates where wild trout production is poor? Or fisheries where angling pressure is high and jobs and incomes are at stake? It's hardly surprising that the EA's policy has caused such a brouhaha.

The stocking policy as it stands offers two alternatives for introducing brown trout into waters where there is already natural trout production. The first and simplest is to stock with non-breeding, all-female triploids, which some clubs and fishery owners have been using for many years. There isn't sufficient space in this article to go into the issues surrounding triploid production and use. The reality is that some fishery interests are perfectly happy with using them and haven't noticed any difference since moving from fertile stocks. This state of affairs is supported by some research that has been done into triploid use and angler satisfaction. However, others have reported concerns over certain behavioural traits, which has prompted further research and trials; indeed a PhD has recently started at the University of Stirling looking at aspects of production and management of triploid brown trout for restocking.

Triploids would seem like the sensible option for those fisheries simply wanting to boost the numbers of catchable trout for anglers. Stocking with adult, takeable-sized fish will ensure that juvenile habitat is left solely for local wild-bred stocks, which can hopefully expand without competition from stock with domesticated genes. Clubs can continue to work hard to build the wild component of the stock and at the same time provide some fish for the rods to catch – it's a very simple formula and makes perfect sense. Even if triploids do prove to have some shortcomings, perhaps it's a price worth paying if wild brown and sea trout stocks can be protected and improved. It's worth mentioning that the numbers of fish stocked should be kept under review and gradually reduced as habitat improvements are made; this makes space for the wild fish to grow on and contribute to catches. It's a brave and often unpopular decision to reduce stocking, but a number of clubs have done so and seen their catches sustained or increased by wild fish (see Box 1).

There are some who like to stock fertile fish as they believe they 'put something back' into the wild stock. This would of course be true if it were based on the premise that stocking with such diploid trout provides fit broodstock for the next generation. But we now know that rather than building a fitter stock, all that we are actually doing is risking debilitating our wild stocks by diluting wild genes with domesticated genes.

The second option in the strategy is the use of local broodstock. Why can't we use this option to rear fish derived from wild broodstock to adult size as an alternative to our current stocking programme? This must be the answer to all our prayers! We could use wild broodstock and stock out thousands of fry or fingerlings, or rear the offspring to adult size and stock out as many as we like for members to catch. Those fish left at the end of the season will spawn and we will top them up with some more from the fish farm next year. It's simple... isn't it? We could set up fish rearing units on every individual river system. Anglers can either catch wild broodstock at the back end of the season or they can be trapped or even electric fished off the gravels just prior to spawning. Pop them into some holding stews, wait a month or two, strip out eggs into a few washing up bowls – give them a squirt of the magic white stuff – stir with a feather – bung in the hatchery to bake for two or three months and Bob's your uncle – zillions of fry to play with! What could be easier? Well, as somebody who has run several wild broodstock schemes I'm tempted to say brain surgery wearing boxing gloves after a night on the beer!

So what are the problems? Well actually, there are many, a small selection of which might include finding a suitable rearing site; obtaining viable broodstock, complying with guidance on the number of broodstock used; loss of natural production in the river; keeping wild broodstock alive and fit prior to stripping; making sure that fish mature in holding facilities; avoiding the problem of swamping with too many offspring from too few broodfish; identifying habitat bottlenecks to inform what life stage to stock fish out at; broodstock reconditioning... the list is long.

> "Stocking more will either result in displacement or death of stocked fish, wild fish, or both"

Egg stripping a trout.

Finding a suitable rearing site is difficult. Not many fish farmers are prepared to risk their bio-security and allow wild fish to be brought through the gates. Let's assume you can find a suitable rearing site with a hatchery facility located on a reliable spring source and with suitable stews or holding ponds on a stream source with excellent water quality and reliable flows. Holding stews for broodstock will need to be located on a stream source rather than a spring source because dropping water temperatures are an important cue for maturation.

The EA will probably only allow 'local' rearing regimes to be set up. How local is local? We know that genetic diversity in wild trout populations can vary within a single catchment and in some cases different unique brown trout 'species' or strains co-exist in the wild without inter-breeding. The latter derive from post-glacial colonisation from different refuge areas and form part of our wildlife heritage (see *Science Spot* elsewhere in this

Gopsall Fishing Club stocking experiences

Mark Owen

The River Sence is a lowland river running off clay in North West Leicestershire, part of the Trent catchment. Gopsall Fishing Club have trout fishing on about five miles of the river. The earliest record of stocking on this part of the Sence is in the book *By Dancing Streams* by Douglas McCraith who, writing in 1929, states that in 1925 the river was netted of coarse fish and stocked with two and three-year old brown trout to augment known wild trout populations. McCraith then states that he joined Gopsall Fishing Club in 1928 and that in the preceding two years a total of 750 trout were stocked. The river then was very different to today as in the intervening years the river has been degraded by being straightened and dredged to drain agricultural land and prevent flooding.

Club stocking and catch returns are patchy and show little consistency over the years between the 1920s and the beginning of the 21st century. Some of the stocking practices were in response to severe pollution incidents from a number of sources including a sewage treatment works, an open cast mine, a brickworks and farm slurry incidents. By 2000 it was commonly thought that the river harboured no wild trout at all, but in recent years water quality has greatly improved. In addition, the club began habitat improvement works in 2000 and, aided by WTT and Environment Agency advice and support, in the last three years these have accelerated and become more focused.

The river suffered from livestock damage to banks and a lack of instream habitat, the legacy of land drainage works. Extensive fencing has been completed, large amounts of large woody debris retained and flow deflectors and gravels have been added, providing an increase in refuge sites from predation and flood events. Pollution incidents have decreased and the river now clears quickly following flood events as banks have become stabilised due to fencing off live stock access. As well as stocking adult fish the club has previously stocked fry and used incubation boxes (both using farmed fish) but this practice ended in 2008 and efforts were concentrated on habitat improvements.

Although it is still early days, the results from 2010 are very encouraging. The number of 12-inch plus fish caught remained at a level comparable with preceding years even though the numbers introduced were around 50% lower. In addition, numbers of river-bred fish (less than 12-inches) contributing to the catch have steadily increased, probably as a result of the habitat improvements. The club now plan to keep to this lower stocking level resulting in significant cost savings which will be used for further habitat improvement.

Recent stocking and catch returns are as follows (all stocked fish were 12 inches or more):

Year	Fish Stocked (all 12-inches +)	Fish caught			
		12-inch + brown trout	Less than 12-inch brown trout	Rainbows	Grayling
2007	650 brown 150 rainbow	222	0	36	11
2008	650 brown 150 rainbow	327	25	28	45
2009	600 brown (triploid)	269	55	3	55
2010	350 brown (triploid)	342	182	0	32

WHAT ABOUT SITES WHERE THE WILD FISH HAVE BEEN LOST AND THERE IS A NEED TO STOCK WITH FERTILE FISH TO BUILD THE POPULATION?

There are undoubtedly examples where stocking with fertile, farm-reared trout has successfully kick-started a population where the wild stocks have died out, usually following catastrophic pollution or drought. If a stream has recovered and affords plenty of high quality habitat it is not surprising that a population can be re-established, particularly if the stocking is carried out via the use of trout eggs seeded into in-stream incubators. The progeny can at least have some selection pressures put upon them as they seek to grow, avoid being eaten by predators and eventually survive to spawn. It will only require one or two redds and a new population can begin. Research has shown however, just how poor domesticated strains are at wild survival and recruiting to the next generation. Potentially much better results could be expected if stocking was carried out with fish derived from local wild broodstock. This is presumably why the EA has deemed that this type of stocking might be appropriate in some circumstances.

When confronted with the problem of trying to re-establish an annihilated population, a better alternative for kick-starting a new trout population might be to take wild trout fry and parr from a nearby similar healthy donor system and seed them out into suitable juvenile habitats. By taking 'excess' juveniles from a healthy donor river there is no loss of valuable broodstock to that system. Even on healthy rivers it is typical to lose 95% of young fish through competition and predation before their first birthday, so taking some to stock elsewhere will have very little impact. A one-off stocking is probably all that is needed provided the receiving water is now in good order and that the problems that resulted in the loss of the original stock have been resolved.

magazine); clearly the careless crossing of such fish in a hatchery programme would be a disaster. But what of catchments where wild trout derive from the same 'strain' – surely these are OK for using wild broodstock? A recent study of a wild broodstock scheme in the Dart catchment found the first generation juveniles produced were genetically quite different from fish of the source streams or any other streams in the catchment, probably because of different selection pressures in a hatchery environment compared with the wild. It could be argued that these juveniles would have poorer survival prospects upon stocking than river-bred fish and that the hatchery programme may not actually increase fish numbers.

The question of whether a hatchery programme will increase fish numbers is influenced by where the bottleneck in wild fish production exists; is it spawning habitat that is limiting, or juvenile habitat, or adult habitat? The fact that broodstock are available in the river means there is bound to be some natural wild production. If a lack of fry or parr habitat is stopping the wild population from expanding then it would be

Wild trout killed by pollution

"whether a hatchery programme will increase fish numbers is influenced by where the bottleneck in wild fish production exists"

pointless stocking juvenile fish because the chances are that every available niche has already got a wild fish sitting in it. Stocking more will either result in displacement or death of stocked fish, wild fish, or both. Some recent preliminary work by the Game and Wildlife Conservation Trust on a southern chalkstream has shown this to be the case - in their habitat-rich study site at least; at best a waste of time and money and at worst damaging to the wild stock. There is also the possibility of reducing growth of all those that remain through increased competition. Not a sensible way forward unless you first create more habitat to take the extra production.

Perhaps spawning habitat is considered the bottleneck and there is abundant juvenile habitat just waiting to be utilized if only enough fry were popping out of the gravels. In such a scenario, there is some logic for fry or parr stocking - but unless the spawning bottleneck is overcome then there will be no chance of building a sustainable wild population until this issue is resolved. Problems will start to build when next year's broodstock are the offspring of previously taken broodstock and so on in subsequent generations. The dangers of inbreeding associated with forced matings, or potentially swamping populations with large numbers of individuals derived from a limited number of parents are well understood. In this scenario we are back to some of the issues associated with domestication. To overcome these problems it is highly likely that the EA will impose a minimum number on broodstock and insist on the maximum number of out-crossings to avoid genetic inbreeding problems: taking a dozen hens, pooling and fertilizing the eggs with milt taken from three or four cock fish will be unacceptable and potentially damaging. Taking 25 pairs out of the river (the lowest number recommended by scientists to avoid issues of inbreeding) may be acceptable as far as avoiding any issues in the hatchery are concerned, but that's potentially at least 25 redds that might have been cut in the river. It never ceases to amaze me how a vibrant wild population can be sustained by so few redds on many rivers; 25 pairs of wild spawners taken from a river might represent 100% of the spawning stock on some systems. Even if wild production is low, it's rarely non-existent and if it were, then there would be no wild broodstock to take in the first place. In this scenario I think I might be tempted to address the lack of wild spawning success by either improving the sites that exist or creating some new ones.

OK, so you have electro-fished 50 wild broodstock – what are the chances of them being 25:25 male to female? You've guessed it: get the gear out, we need to find some more! Now it may be OK to home labradors in your kitchen but don't try it with wolves. I know this analogy is a bit extreme but the reality is that wild fish are wild and not domesticated and when you pop them into holding facilities they don't behave like farmed stock. They become stressed, often to the point where keeping them alive is an enormous challenge. Cock fish especially are hugely prone to infection from fungus which may well kill them and practical treatment options are non-existent. So you lose a few (if you're lucky!). Don't forget that these are precious broodstock, the ones that have survived to maturity and are on the brink of spawning. You can always get the gear out and catch a few more, but how many miles of river will you need to deplete to catch enough fish?

In the wild, fish often spawn over an extended period. It may well be the case that some fish will be ready to spawn much earlier than others. This diversity in spawning time may be an important life strategy and it is likely that the EA may wish artificial spawning to be carried out over a wider time period than just a one-off event. A potential problem for those wishing to take gravid fish off the gravels just before spawning, strip the fish on the bank and place freshly-fertilised eggs into bank-side incubators (thus bypassing the hatchery phase) is what do you do if you complete the task with as many ripe fish as you can catch but only end up with a dozen or so batches? This falls well below the acceptable number of crossings required to avoid inbreeding. The same problems could arise in a hatchery if the brood fish won't strip, or die.

I am waiting to see what EA guidance will say, but for me the whole process is fraught with difficulty and I suspect will only be a viable option on a handful of river systems. In my view, local wild broodstock schemes can never be an adequate substitute for stocking programmes where adult fish are provided currently to support anglers catch. It's back to identifying and removing the habitat bottlenecks for me and if you simply have to stock, then it should be with adult triploids or dare I say rainbows! Yes, I mentioned the 'R' word in Salmo Trutta - burn me at the stake!