Trout Talk

MAKING BABIES

Paul Gaskell of the Wild Trout Trust looks at the importance of "good gravel" for the successful spawning of trout and salmon

LAST MONTH I described how weirs can be more than simple barriers to fish movement. In fact, probably the most significant impact of a weir is the increase in sediment deposition upstream of it. I also showed last month how this can reduce the variety of invertebrates due to the creation of a much more uniform habitat.

Siltation, clearly, will also cause smothering of any gravels and cobbles that may be present in your stream – which brings us on to this month's topic. Silted/choked/non-existent gravel is no good for trout spawning. If we are to fish for wild trout and grayling, we need wild babies – and lots of them – to be produced in the stream.

Most of us could hazard a guess that, in the trout's world, babies come from gravel. So, while we may all know that trout need gravel to spawn, is that the end of the story? Clearly not, and in fact as a starter for ten most anglers are surprised at the relatively large size of particles that constitute "good" spawning gravel (in the region of about ½ in to perhaps 2 in in diameter). But what about terms such as "well-sorted", "concreted", "localised bed-scour", "tufa" and "constantly irrigated"? Read on and all should become clear...

Trout and salmon are pretty canny when it comes to protecting their eggs – they bury them. In late autumn or winter, the female fish cuts a pit in the riverbed gravels by lying on her side and vigorously wafting her tail. The eggs are fertilised by the male as they are deposited in the pit, then the female moves forward and cuts another pit immediately upstream, burying the first batch of eggs with the displaced gravel. This can be repeated several times, creating the characteristic pit and tail, or hump, of gravel known as a redd. The eggs and hatchlings (alevins) spend several ➤

PHOTOGRAPHS: JOHN PEARSON

Pinch point on the Dulas brook. Note Y-shaped log and boulders deliberately installed in the pinched flow.

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weeks in the gravel before emerging in spring. How many make it out alive depends very much on the condition of the gravel...

The large and ill-fitting nature of these pebbles means that, in the absence of excess silt, water filters through the gaps between the jumbled particles. This "below-gravel flow" is essential for supplying the eggs with oxygen. Sometimes upwelling springs do this, but more commonly the eggs are irrigated by surface flow directed and focused through the gravel. This is why fish often spawn at points of increasing gradient in the riverbed (the tails of pools and heads of riffles), where gravity pulls the water down into the riverbed.

Mounds of loose gravel are also favoured spots for spawning. The diagram (right) shows how the combination of bed scour, deposition and the resulting "pocket and mound" structure conspire to produce this magical effect. Bed scour produces both a holding pocket for adult fish (worth remembering when you come across one with a fly-rod in your hand) as well as "grading" the deposited gravels: the larger particles settle in faster flows, while smaller particles can settle only where the flow has diminished. The fact that the mound of gravel has the good fortune (or is it design?) to be sitting directly downstream of the upward sloping tail of the scour hole is the key to water flowing between the clean, loosely fitting particles.

The foregoing represents ideal egg incubation conditions – but what can happen to spoil this picture? Well, in calcium-rich waters "tufa" (solid calcium carbonate) can build up and bind gravels together in a crust that blocks any percolation of water. In areas where tufa forms readily, gravel breaking and cleaning is often needed to keep spawning success suitably high (it is worth noting that egg survival in chalkstreams is typically very poor because of this effect but can be offset a bit by the relatively fast growth-rate of any surviving offspring in the rich environment).

A similar clogging effect can, clearly, result from excessively large inputs of fine sediment from the land surrounding your river. Tackling the source of the sediments should be the priority, but in the meantime the symptoms can be addressed. Breaking tufa crusts and using a pressurised water jet or backpack leaf-blower to wash silt out of patches (*not* whole reaches) of gravel beds can help overcome both clogging with excess silt and tufa formation. However, this should always be complemented by getting the river to clean itself.

The natural processes, resulting from fallen trees, which clean and irrigate gravel can be mimicked by introducing and fixing a range of large woody debris (LWD) structures.

Obviously, where there is plentiful natural deadfall of trees (must be left in the river!) there is no need to gild the lily. *But*, whether naturally occurring or deliberately introduced, self-cleaning gravels can only arise when there is sufficient energy in the stream flow.

In other words, the river needs enough vigour in the current to work on the streambed, blow away silt and sort gravels into the required particle size range.

What can you do, though, where a stream that has gravel has become degraded and the required current velocities do not occur? Well, as in the whole of this series, you must first properly define the problem. While it is always true to say, "If it ain't broke, don't fix it", we should extend that to, "Don't tart up the things you like doing, while ignoring something that genuinely *is* broken."

Here are two instances where we need to view things coldly and objectively:

1. In lower reaches of the river that are classically mixed coarse- and game-fisheries it may well be inappropriate to create spawning habitat. Instead, in most cases, we should ensure connectivity (*ie* no barriers) to spawning tributaries and headwaters.

2. If the best potential for creating good spawning habitat exists on small, unloved, tributaries or reaches of your river that your club does not fish; then *even though you don't fish it,* you should look into doing the habitat work outside the club's leased/owned fishing.

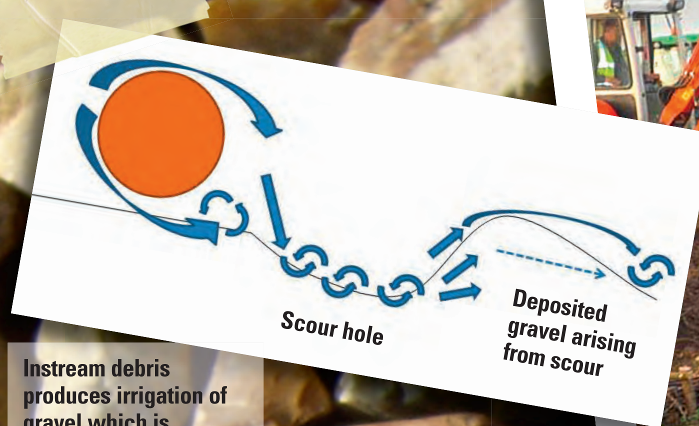
Assuming that there is a realistic need and potential to tackle a lack of suitable spawning habitat (perhaps otherwise suitable habitat has been degraded by poor land-use practices), there will often be a requirement to locally increase the current velocity. Again, we must identify the specific reason for the sluggish nature of the current and, fortunately, these reasons tend to fall into one of only two categories:

1. The stream channel has become too wide and/or deep, maybe because of dredging, trampling by livestock, or poorly placed footpaths.

2. The water is impounded by a weir.

Given that I wrote about weirs last month – and the general desirability to notch, lower or remove them to energise the current – we can skip blithely on to look at tackling the first ➤

"The river needs enough vigour in the current to work on the streambed"



Instream debris produces irrigation of gravel which is deposited at the tail of


River Meon: narrowing of the main channel courtesy of the mechanical digger, with grazing


Using a backpack leaf blower to manually clean gravel. This treats the symptoms, but not the


Eyed ova, the jewels in the gravel that are the future of our trout stocks. We should give them a

"Some timely advice. Don't tart up the things you like doing, while ignoring something that genuinely *is* broken"


Pressurised water jetting is another way of dealing, albeit temporarily, with a

A "pinch point" made from logs with a gravel backfill – brushwood could also

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The Meon again, this time showing how grazing exclusion helps the speedy re-vegetation and narrowing of

"Imagine putting your thumb halfway across the end of a running hosepipe"

problem. But before we do, a quick mental image to help us all picture what it is we are actually doing. Imagine putting your thumb halfway across the end of a running hosepipe – *squuiirt!* There you go – all you need to know about the relationship between volumetric discharge, cross-sectional area and linear velocity!

On the opening page of this article is one example of how a pinch point (this time on a river rather than a hose) could be created in order to increase current speed in a localised area. Notice that structures (logs) to promote bed scour have been installed in the narrowed section of river. All very well, but what are that dead tree and those brashy roots doing messing up the view downstream of the structure? All will be revealed next month...

Of course, narrowing longer reaches by large-scale re-profiling of the channel is also sometimes undertaken (often at considerable expense, it must be noted). However, there is an increasing move (when possible) to go for low-tech and relatively cheap options of simply pushing bank material in using bulldozers under the careful direction of "someone who knows what they are doing".

Of course, if the channel is overwide because of excess grazing and trampling from livestock, a simple fence will often allow the vegetation to "self-narrow" the channel all on its own (or else it will enhance manual efforts to narrow the channel as well as providing great invertebrate habitat).

What about where dredging has "over-deepened" the river by removing bed material? This is a double whammy, for not only are the channel dimensions increased (and the current slowed to a sluggish crawl), but the actual gravel needed for spawning itself is piled up on the banks – well out of reach of any amorous trouty couplings. Here, we need to import gravel in ½ in-2 in diameter particle size range – and lots of it. The aim is to pinch down and speed up the current flow as well as to provide the substrate needed to incubate our babies.

So, having got your good flow and perhaps replaced gravels that have been historically removed from the channel, it is time to consolidate that position and ensure that we have all the benefits of a lovely, lumpy "egg-box" contoured stream bed that we get from our much-loved large woody debris introductions. Looking back to our "self cleaning" examples above, we should definitely think along the same lines for streams that we have narrowed and/or imported gravel into.

Now you've got your baby fish, you'll need to make sure they've got a decent whack of nursery habitat where they can hide from everything in and around the stream that wants to eat them. More of that next month.

Factfile

There are hundreds of ways to skin the "spawning bottleneck" cat. The appropriate design and installation techniques for achieving these effects are the WTT's stock in trade and we'd love to share our tricks with anyone who would like to improve their wild fish populations! Get in contact with us via the website www.wildtrout.org or via the phone, 023 9257 0985.