

Is this a sea trout or a brown trout?

This was the question that accompanied a photograph on social media recently, alongside a rather large trout. And the answer is... well, it's complicated, but interesting. Denise Ashton tackles a tricky one

TO start with what may not be obvious: we think that sea trout and brown trout are the same species, *Salmo trutta*. A sea trout is a brown trout that has decided to go to sea and in order to do so, it has been through a process of 'smoltification'. This process means trout change in some amazing ways: for example, they become silvery by producing guanine crystals on their scales, their eyes enlarge and their internal organs adapt to cope with the moves between fresh and seawater. It is the distinctive silvery colour that most people associate with sea trout, so a silver trout is a sea trout and a brown trout is... well, a 'resident' brownie. Isn't it?

Certainly, a trout that is very silvery and perhaps has a couple of sea lice attached to it is very likely a sea trout (or maybe a salmon – but that is another story). Fresh from the sea, this is what you would expect of an adult sea trout. A very small silvery trout, perhaps less than ten inches or so, is most likely to be a smolt on its way downstream to the sea. Smolts tend to migrate in shoals downstream at night in April /May and possibly also in the autumn. Apparently, they swim backwards, and hate going over weirs which is why weirs can be a problem downstream as well as upstream migration (again, another story).

The story gets a little more complicated when sea trout return to fresh water. This may not be a simple upstream migration from sea to spawning gravels. In some



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places, sea trout 'slob' back and forth from river to estuary. And sea trout are great explorers. Vagrants may have a nose around a few local rivers before returning to their natal river to spawn. Some will stray to spawn – this is how trout arrived in our rivers after the last Ice Age and how *Salmo trutta* has become such a successful non-native invader in the southern hemisphere. During these wanderings, and whilst holding up in the river waiting to spawn, sea trout start to lose their silvery colour and revert to looking like in-river (or

lake) brown trout. Being brown and spotty is a much better camouflage in the river than standing out, all bright and shiny silver.

Once the obvious silver colour has gone, there are some clues that will tell you it is a sea trout, but they are not absolutely reliable. The most obvious is size. One reason that sea trout follow the often-risky strategy of going to sea is because the food supply at home is poor, but the benefits must outweigh the costs. In order to grow big and produce lots of eggs to pass on genes to the next generation (most sea trout are female), it pays to go to sea to grow large. The (often male) resident trout stay rather small in comparison.

However, there are sea trout in chalk and limestone rivers where there is plenty of food and in these rivers, there may not be such a big difference in size. Why would a trout go to sea, if there is plenty of food at home? That is a question that still puzzles scientists. It's clear that anadromy (migrating to sea) is a function of environment (e.g. food availability) and genetics (all trout were once sea trout and retain a propensity to migrate) but a recent (2019) scientific paper by Prof Andy Ferguson and co-authors suggests that it's an individual decision – a layman's version of that paper will appear in WTT's 2020 journal. So, genetics alone is not going to tell you if your trout is a sea trout or a river 'resident' trout.

A rather more unreliable clue is behaviour. Sea trout like to jump out

A silver sea trout in the River Cothi.



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of the water especially at dusk and at night, they tend to move upstream at night often quite noisily and are more likely to be in close proximity to one another than wild resident brown trout. However, a trout caught on a dry fly in the middle of the day might still be a sea trout, especially if water levels and light levels are low.

The next clue is not for the riverbank and requires a modest amount of science. A trout scale has growth rings in the same way as a tree has growth rings. A sea trout scale should show a period of rapid growth due to the extra food it has found in saltwater. Sometimes it is obvious, sometimes not, and accurate scale reading needs a good level of skill and lots of experience.

So finally, the most likely source of a definitive answer is proper science – and one powerful technique which can be applied non-destructively to the fish is stable isotope analysis

(SIA). Different food webs have very distinctive chemical signatures which stay in fish scales and this means that it is possible to trace where the fish has been feeding. Unfortunately, this technique isn't readily available to anglers! Our own Jonny Grey is an expert in SIA and is supervising students using this technique to establish whether the surprisingly large trout in some streams in eastern England are sea trout or not.

One final note. Some trout in freshwater seem to be real homies

but many trout are wanderers, sea trout perhaps most famously. 'River' trout may well move huge distances at certain times of year (e.g. running upstream in the autumn or winter to spawn); some might nose into the estuary or an on-line lake for a feed. 'Lake' trout might migrate big distances within large lakes or into in- or out-flowing rivers, again perhaps to spawn. So, mooching around a good bit is in a trout's blood, a big factor in why the species is so successful and incredibly interesting.



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For more information on the topics covered in this article, go to the Wild Trout Trust website. Use the 'search' box (top right) to find articles, web pages and blogs on topics such as a scale reading, genetics, sea trout and stable isotope analysis. See also our Trout Facts and Sea Trout pages in the 'About Trout' section.