

A new chemical method for distinguishing between farmed and wild salmon

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Wild salmon and farmed salmon can now be distinguished from each other by a technique that examines the chemistry of their scales.

Dr Clive Trueman, who is based at the National Oceanography Centre, Southampton said:

"Salmon farming is a big, intensive business. In 2006, around 130,000 tonnes of salmon were farmed in Scotland for the table. Wild populations of Atlantic salmon are in serious decline across their whole range and the total wild population returning to Scottish rivers in the same year is estimated at less than 5000 tonnes. [Wild fish](#) are rare and expensive so there is a strong incentive for fraudulent labelling. Farmed fish also escape into rivers, harming the wild population. Unfortunately, it can be difficult to distinguish between farmed and wild fish"

The new work which was done in collaboration with the Scottish Association for Marine Science (SAMS), Oban, will help crack this problem.

Fish scales are formed from the same chemicals as bones and teeth and grow like tree rings, preserving a chemical record of the water the fish lived in throughout its whole life. Scales are easy to collect, and can be removed from fish without harming them - which is important when studying an endangered population. The team discovered that levels of the trace metal manganese were always much higher in fish of farmed origin.

"This is probably caused by manganese supplements in fish food, and also because conditions underneath the fish cages promote recycling of manganese in the water column," says Dr Elizabeth Adey from SAMS, lead author on the research.

Using relatively simple techniques, the team was able to distinguish between farmed and wild fish with 98% accuracy.

"Because of its non-destructive nature, this technique could be used to assess the proportion of farm escape salmon present in any river, and therefore identify where additional conservation and wildlife protection measures are needed," says Dr Trueman, a geochemist with the University of Southampton's School of Ocean and Earth Science, based at that National Oceanography Centre.

Concern over declining numbers of wild Atlantic salmon has led to the closure of most fisheries, and the growth of salmon farms has been implicated in the decline of the wild fish. In 2000, more than 400,000 fish escaped from farms in Scotland. This is a problem as farmed [salmon](#) are not adapted to the local environment, and if they breed with the wild stock, the resulting offspring are less likely to survive to adulthood. In some years, the number of fish that escape from farms in Scotland exceeds the total number of wild fish, and in some Norwegian rivers more than half of all fish are of farmed origin.

It is particularly difficult to distinguish between a farm origin and wild origin fish if some time has passed after the fish escaped, and that is why the new method should prove valuable.

The team also found differences in the chemistry of scales between fish farms, which might allow researchers to identify individual farms responsible for the release of wild fish - although this would require additional work.

More information: E. A. Adey, E. A., Black, K. D., Sawyer, T., Shimmiel, T. M. & Trueman, C. N. Scale microchemistry as a tool to investigate the origin of wild and farmed *Salmo salar*. *Marine Ecology Progress Series* 390, 225-235 (2009).

Source: National [Oceanography](#) Centre, Southampton

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