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# Increased oestrogen pollution in European rivers could affect development of brown trout

**Brown trout (*Salmo trutta*)** embryos exposed to oestrogen during development hatched earlier, grew more slowly and had a lower heart rate than unexposed individuals, according to a recent Swiss study. These findings may indicate that oestrogen pollution in some European rivers is contributing to the decline of wild populations of such species.

**Endocrine disrupting compounds** (EDCs) affect animals' hormonal systems and can impair growth. Previous studies have demonstrated that the presence of EDCs — including beta-estradiol, a natural oestrogen — has a negative impact on fish species. However, the impact of pulses of exposure of the hormone had not been investigated. This is an important issue as the level of EDCs in European rivers fluctuates due to the intermittent release of these chemicals from sewage treatment plants.

In this study the authors aimed to replicate a pulsed exposure to estradiol to determine if and how development of brown trout embryos is affected.

The researchers collected brown trout from a hatchery in Switzerland and separated the fertilised eggs into four different exposure scenarios (A, B, C and D). Exposures A and B comprised single two-hour exposures of estradiol — 30 minutes after fertilisation in A, and 38 days after fertilisation in B. Exposures C and D involved multiple two-hour exposures of estradiol until the embryos hatched — in C these were weekly, beginning 7 days after fertilisation, and in D bi-weekly, beginning 30 minutes after fertilisation. Each scenario was repeated with a low (3.8 nanograms per litre (ng/L)) and high (38 ng/L) concentration of estradiol and a 'control' solution for comparison, which did not contain any added estradiol. These different concentrations reflected the fluctuations that the fish may experience in the wild.

During the experiment the researchers recorded the impact of estradiol exposure on several factors, including embryo survival, egg weight and size and the time of hatching, growth and heart rate.

No difference was found between each treatment in egg size and egg weight, or number of deformities. The researchers did found that all embryos treated with estradiol hatched on average earlier than those in control treatments. In addition, the time taken for the eggs treated with a single exposure of estradiol (scenarios A and B) to all completely hatch was longer than for those in the control group, but this phenomenon was not witnessed in the multiple exposure scenarios (C and D).

Finally, brown trout that hatched from eggs that were treated with estradiol 30 minutes after fertilisation (scenarios A and D) were significantly shorter than those in the control group, and the heart rate of all newly hatched brown trout was lower when they had been treated with estradiol.

The authors warn that the results of this experiment suggest that the development of brown trout could be affected in European rivers where there are periodic releases of estradiol. Trout with lower heart rates hatching earlier in the year, when water temperatures are lower and there is reduced food availability, may also be less likely to survive.

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