Climate threatens trout and salmon

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Trout and salmon are among the world's most familiar freshwater fishes, but numbers have fallen over recent decades - in some areas, dramatically.

Pollution, habitat loss and over-fishing have all been blamed in the past, but new evidence from Cardiff University shows that climate change could be a major factor, putting both species at risk.

The scientists studied populations of young salmon and trout in the River Wye in Wales, traditionally one of the UK's best angling rivers. Professor Steve Ormerod and colleagues from the Cardiff School of Biosciences found salmon numbers fell by 50% and trout numbers by 67% between 1985 and 2004 - even though the river itself became cleaner.

The fish were hit hardest following hot, dry summers such as 1990, 2000 and 2003. The results suggest that warmer water and lower river levels combine to affect both species. As both trout and salmon favour cool water, they face potentially major problems if climate warming continues as expected in the next two to three decades.

"Huge efforts have been put into bringing salmon back into Europe's formerly polluted rivers such as the Taff, Thames, Clyde, Seine and Rhine, so these results are a major worry," said Professor Ormerod.

"Salmon and trout fishing also generate many jobs and large economic benefits. In Wales alone, salmon fishing contributes around £90 million

annually. Any risk of eventually losing these species to climate warming is therefore one we must consider very seriously. We suggest measures to ensure that river levels are maintained in hotter conditions alongside the use of riverside trees to create shade and protect against the highest temperatures. This week's Wales Sustainability Week is an ideal opportunity for us to consider action for Welsh rivers, particularly because trout and salmon are such important sustainability indicators."

The Cardiff team used data on fish population collected each year by the Environment Agency at more than 50 locations spread throughout the Wye. Stream temperatures increased over the study period by 0.5 - 0.7ºC in summer and 0.7 - 1.0ºC in winter, with the latter effects apparently affecting the fish at low flow. Water temperature is known to affect growth and susceptibility to disease in these fish, while lower water levels restrict their access to cooler habitats.

Peter Gough, fisheries scientist with Environment Agency Wales, added: "We recognise that climate warming is probably already affecting many elements of our natural environment, including salmon, trout and sea trout, and this detailed analysis of our long-term data is extremely interesting and, if proven correct, would be of great concern. We are currently examining these and other data further. There is a suggestion that earlier migration to sea of salmon smolts might account for at least part of the apparent decline, but this doesn't explain the reduction in trout numbers. More work is needed to clarify some important issues."

The comparison between trout and salmon is important because, unlike salmon, trout from the Wye never migrate to the sea. Only factors affecting the river can therefore explain their decline.

A paper on the findings has been published in one of the world's leading environmental journals, *Global Change Biology*.

Provided by Cardiff University