Extreme winters impact fish negatively

EurekAlert!

Ecologists from Umeå University and the Norwegian University of Science and Technology in Trondheim have studied fish communities and fish habitat and reviewed the importance of winter conditions for fish in streams and rivers in cold regions. The findings are now being published in the journal *BioScience*.

It is well known that winter can be a stressful season for plants and animals in streams and rivers. It is reasonable to assume that more extreme weather conditions are the most taxing, but the ecological significance of this is poorly understood.

The research team, headed by Professor Christer Nilsson at Umeå University, describes how extreme conditions – especially those associated with ice formation and ice break-up – vary over time and affect both the non-living river environment and its fish. For example, streams can fill up with ice and kill all the fish that do not manage to flee to backwaters or stretches with deep, quiet water that is not filled with ice. Young fish are especially vulnerable.

The researchers also discuss how humans have impacted what happens in streams and rivers in the winter.

"Rivers that have been exploited for hydroelectric power can be especially hard for fish to live in, because the way hydropower is produced often means that the flow changes radically very quickly and often, which can lead to repeated ice break-ups and a great deal of anchor ice formation. When the ice cover at the surface disappears, cold air is fed downward in the water and forms ice crystals that cover the bottom, making it hard for fish to survive," says Christer Nilsson.

The scientists draw a number of conclusions from the study. One is that more measurements are needed in order to be able to predict when extreme situations in waterways may arise and that information about both the lives of different fishes and how they are affected by extreme events should be included in such data gathering. Another is that models of how water moves and what fish populations look like should also take winter conditions into consideration.

Today most models focus on the ice-free period. A third conclusion is that in order to be able to manage streams and rivers in a long-term sustainable manner, we need to pay attention to future changes in climate when we, for example, design restoration and conservation measures.

"The predictions made about what the winter climate will be like in the future say that there will be more back and forth between thaw and frost, entailing more unstable ice conditions, more rain, and flooding, and ultimately perhaps more challenges to the survival of fish in many waterways," says Christer Nilsson.

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