

# Pacific salmon may be dying from leukemia-type virus

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In Canada's Fraser River, a mysterious illness has killed millions of Pacific salmon, and scientists have a new hypothesis about why: The wild salmon are suffering from viral infections similar to those linked to some forms of leukemia and lymphoma.

For 60 years before the early 1990s, an average of nearly 8 million [wild salmon](#) returned from the Pacific Ocean to the [Fraser River](#) each year to spawn.

Now the salmon industry is in a state of collapse, with mortality rates ranging from 40 percent to 95 percent.

The salmon run has been highly variable: The worst year came in 2009, with 1.5 million salmon, followed by the best year in 2010, with 30 million salmon. But the overall trend is downward.

Losses were particularly high in elevated river temperatures; warmer water makes it more difficult to deliver oxygen to the tissues of salmon.

Seven of the last 10 summers have been the hottest on record for the Fraser River. But experts say it's too soon to pin the blame on global warming.

"Clearly, a warming climate is going to produce some new stresses for [Pacific salmon](#)," said Daniel Schindler, a professor of aquatic and fishery sciences at the University of Washington in Seattle. "Some of

those stresses will certainly be expressed through increased susceptibility to disease, including something like this."

But he added: "The reality is we have very poor understanding of how climate and disease dynamics interact with each other in salmon. We know they're going to be important, but we can't say a lot in detail."

Two years ago, Canada's prime minister ordered a judicial inquiry - known as the Cohen Commission - to investigate the salmon deaths, with a final report due by June 2012.

Scott Hinch, an investigator at the University of British Columbia's Pacific salmon ecology and conservation lab and a co-author of a study on the salmon that was published in the journal *Science*, testified before the panel last month. He told it that the virus could be the biggest factor that's driving the collapse.

The study raises "a big red flag," providing scientists with a possible new explanation, said Brian Riddle, the president and chief executive officer of the Pacific Salmon Foundation in Vancouver, British Columbia.

"The critical thing is that for years, people have wondered about the rate of decline and how it can be pretty consistent across most populations in the Fraser," he said. "This provides a viable reason now. We're discovering something new. There's still a lot unknown. We don't understand the origin of the virus. We don't understand how it functions."

He said much more study was needed.

"If this really is a virus and it's something we don't understand, then we don't know how to treat it or control for it," Riddle said. "So this is something that could linger with us for a long time, and possibly until the

animal learns how to deal with it. That will only happen through natural selection-type processes."

As part of Hinch's study, salmon were caught, tagged and implanted with radio transmitters and their blood, gill, muscle and fin tissues were biopsied. Scientists then tracked them and discovered that many were stressed and sick before they reached their spawning grounds.

According to the study, ocean-tagged salmon that had the gene signature associated with the viral infection were 13.5 times more likely to die before spawning.

Hinch said the scientists thought that the salmon became infected at sea, before making their runs upriver. He likened it to "dead fish swimming."

If researchers can confirm the findings that a virus related to [leukemia](#) is responsible, "it would be quite novel," said Hinch.

While there's no similar research taking place in the United States, Schindler of the University of Washington said there was no reason not to assume that salmon in the nearby Columbia River in Washington state would be suffering, as well.

Glen Spain, the Northwest regional director of the Pacific Coast Federation of Fishermen's Associations, said other issues were at play and that "a cascade of interrelated factors," not just a virus, could be causing the salmon deaths.

"There are fundamental habitat issues that weaken the salmon when they have too little water in the river or when the water is poor quality, when the population is truncated because of dams and there's less biological diversity," he said. "All of those are risk factors for any number of diseases. ... It's sort of like the blind man and the elephant. Everybody

thinks that what they've got in front of them is the elephant. The reality is that it's a whole ecosystem."

He added: "If this is a virus, it's an endemic virus and it's been out there for thousands of years. The question is, if it's attacking fish now, why now?"

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