# Acidification threatens the world's fish species

**BY ETHAN BARON, THE PROVINCE** DECEMBER 13, 2009

W hile in Copenhagen the world debates its response to global warming, a related but little-known menace is threatening B.C.'s salmon and other fish species.

Delegates to the international climate summit in Copenhagen are focused on the climatic effects of carbon-dioxide emissions from burning fossil fuels. But those emissions cause another effect that scientists believe may significantly damage the world's fisheries.

Oceans absorb an estimated 30 per cent of carbon dioxide. That's good for slowing global warming, but bad for the animals living in the ocean, including fish.

As seawater absorbs carbon dioxide it becomes more acidic. And B.C. is likely to be among the first regions to feel the damage from ocean acidification, says Debby Ianson, a federal Department of Fisheries and Oceans scientist based in Sidney.

"Other than the Arctic and Antarctic, this is where we'll see the negative effects first," Ianson says. "In terms of an impact from climate change that's really going to affect people, our children and grandchildren, ocean acidification is probably the biggest." The north Pacific that washes against our coast already has the highest carbon levels in the world because of temperature and ocean currents.

Carbon levels, and therefore the level of acidification, are higher in deep water, but research by U.S. oceanographer Richard Feely has revealed that since the Industrial Revolution north Pacific acidification has risen so steeply that shells of sea creatures will begin to dissolve at a level 50 to 200 metres closer to the surface.

Combine that situation with the summertime upwelling of deep, acidified water that occurs off B.C.'s coast and you have a substantial risk to an important food source for salmon: the pteropod or sea butterfly.

So far, the animals have been able to respond to acidification by exuding a coating onto their shells, but as the north Pacific becomes more acidic, it's likely the pteropods at some point will no longer be able to protect themselves, Ianson says.

Cold-water corals, such as those found in Alberni Inlet and believed to be important fish habitat, are also extremely susceptible to damage from acidification as they're made of aragonite, which dissolves in acidic water, Ianson says.

Salmon, and the rest of the world's fish, face another threat from ocean acidification, says University of B.C. scientist Daniel Pauly, author of a recent article in The New Republic about fisheries collapse titled "Aquacalypse Now." Fish, of course, breathe water, but like humans they need to take in oxygen and eliminate carbon dioxide ($CO_2$). To get rid of the $CO_2$, fish rely on a differential between the amount of that compound in their bodies and the amount in the water, Pauly says. Because the concentration of $CO_2$ within the fish is far higher than in the seawater, they can rid their bodies of the compound effectively. Increasing the amount of $CO_2$ in the water makes it harder for a fish to expel it from their bodies.

"If you have lots of $CO_2$ dissolved in the water, the breathing becomes more difficult -- the breathing performance of all animals that breathe water is reduced," Pauly says.

Loss of breathing performance can have drastic results, Pauly says.

"If you force the fish to spend more energy breathing, even if it's one per cent or two per cent, this energy is taken away from another activity -- escaping predators or eating," Pauly says.

"Every time you stress a system such as the ocean with something, its productivity diminishes. For humans, it means that acidification will diminish fisheries catches, potentially."

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