WATERS OFF ALASKA GROWING MORE ACIDIC

A recent study of ocean waters off the coast of Alaska shows evidence of a growing trend: Ocean acidity levels are increasing more quickly than previously thought. That ocean acidification could spell trouble for salmon and shellfish, as well as the people who rely on fisheries to make a living.

"The controlling mechanism for acidity in the ocean is the amount of carbon dioxide in the atmosphere," says Jeremy Mathis, a chemical oceanographer at the University of Alaska at Fairbanks, who conducted the research last spring. "The more carbon dioxide you pump into the atmosphere, the more carbon dioxide is going to be absorbed into the ocean."

Once carbon dioxide mixes with seawater, it forms carbonic acid, which immediately disassociates, releasing a hydrogen ion and becoming bicarbonate. The bicarbonate disassociates as well, releasing another hydrogen ion as it becomes carbonate. These hydrogen ions lower the pH of the ocean, making it more acidic.

Cold waters, such as those around Alaska, are more susceptible to acidification because they can hold more carbon dioxide, says Richard Feely, an expert in ocean acidification at NOAA's Pacific Marine Environmental Laboratory in Seattle, Wash., who was not involved in the new research, but is on the committee reviewing the data. Feely's own research suggests that polar and subpolar waters are very likely to grow more acidic as more carbon dioxide enters the atmosphere.

Mathis' new study confirms that at least around Alaska, the waters are growing more acidic. Last spring, Mathis collected seawater samples from the Gulf of Alaska and found acidity levels that were higher than he expected. Previous sampling had also shown similar findings in the Chukchi and Bering seas around Alaska. The new data are still going through peer review and have not yet been published, and so numbers are not yet publicly available. However, Mathis' findings on the shelf of the Chukchi Sea found saturation states as low as 0.8 for aragonite, a calcium carbonate mineral that is often in shells. At lower saturation states, less calcium carbonate is available to build shells, and a level below 1.0 indicates that water is acidic enough to be corrosive.

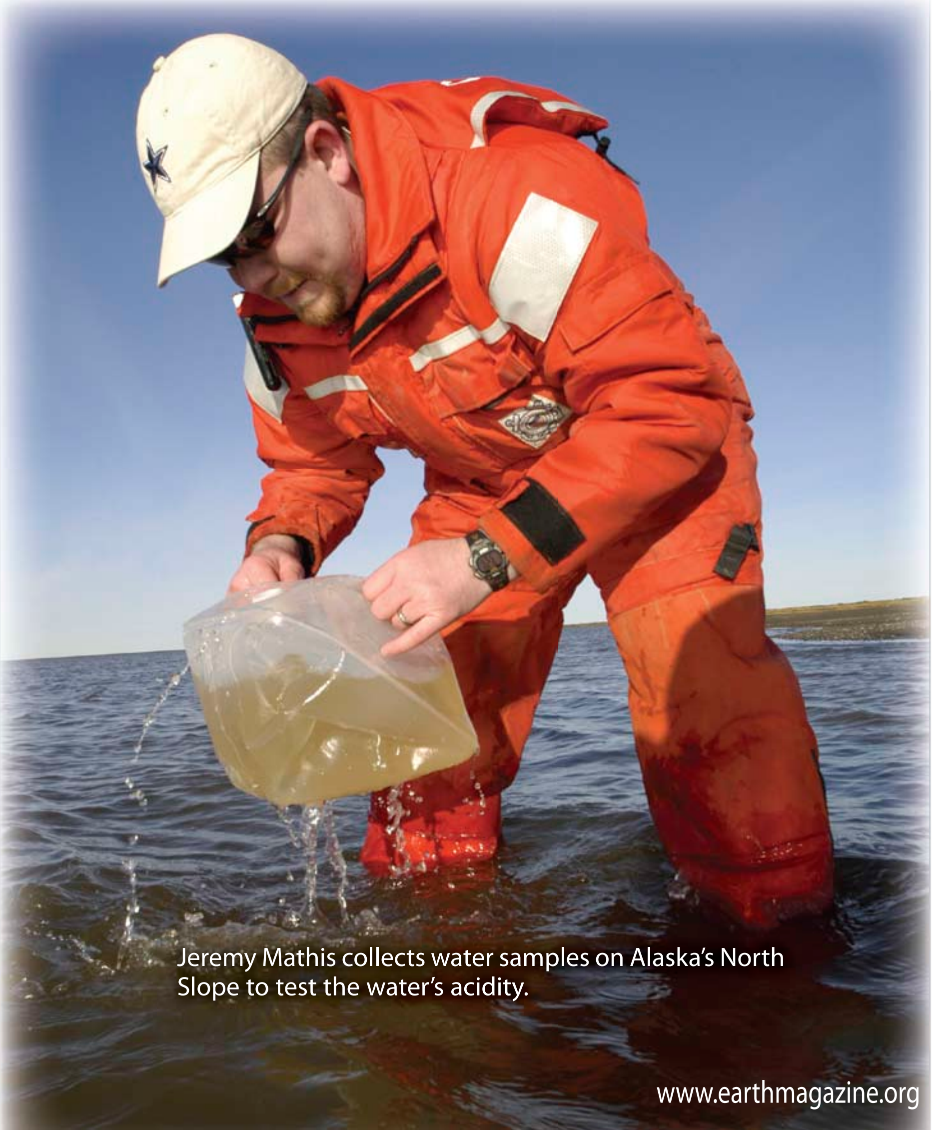
Acidification is a problem because highly acidic waters dissolve the delicate shells and skeletons of creatures such as oysters, crabs and tiny mollusks called pteropods that float suspended in the ocean waters. Some of the species affected by acidification, like pteropods, account for almost half of the diet of Alaska's pink salmon.

Mathis' findings "show that corrosive waters are impacting organisms on the continental shelf right now, rather than 50 years from now," Feely says. And Alaska's fishermen are already nervous.

"I have been meeting with the fishery industry here in Alaska, and they're telling me anecdotal things. The big message this year has been that the pink salmon are coming back smaller than they were in previous years," Mathis says. Although he says he can't attribute this year's smaller fish to acidification, he says that it's what we can expect to see in the future. "Ocean acidification is going to set the scenario for pink salmon size to decline, by reducing a food source. It will likely reduce the number of pteropods in the ocean."

Thus, global warming is not the only unwanted side effect of pumping tons of carbon dioxide into the atmosphere. But one solution can help solve both problems, Mathis says: "Because the controlling mechanism is carbon dioxide, we really need to get serious about reducing carbon dioxide inputs into the atmosphere, because the more carbon we put in the atmosphere, the lower the pH of the ocean is going to go."

Bernard Langer



Jeremy Mathis collects water samples on Alaska's North Slope to test the water's acidity.

Courtesy of Jeremy Mathis