# Scientists worry North Pacific salmon may run out of food

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With the number of salmon in the North Pacific having doubled in the past 50 years, scientists are increasingly concerned there may not be enough food to support them, and changing ocean conditions could make it even worse.

On the surface, the mounting scientific evidence would seem to contradict conventional wisdom that salmon are a disappearing species. But as with everything salmon, it's more complicated.

While more than $13 billion has been spent since 1978 to try to restore endangered wild salmon populations in the Pacific Northwest, salmon hatcheries in the U.S., Russia, Japan and Canada have expanded rapidly.

In 1970, 500 million hatchery-raised salmon were released. In 2008, more than 5 billion hatchery fish headed out to sea. As with wild salmon, only a small percentage of the hatchery fish actually survive to spawn.

Once in the ocean, the hatchery fish are competing for the same food as the wild salmon. While the North Pacific and the Bering Sea may be vast, salmon often congregate in the same feeding grounds.

"Many hatcheries were built on the premise that the ocean had an unlimited capacity to support all salmon," said Gregory Ruggerone, a fisheries scientist who works for Natural Resources Consultants in Seattle.

That may not be true. With nearly 650 million adult Pacific salmon swimming in the ocean at any given time, the competition for food is increasing, and the already shrinking wild stocks could be crowded out.

"It could lead to a reduction in wild stocks," said Randall Peterman, a professor in the School of Resource and Environment Management at Simon Fraser University in Burnaby, British Columbia.

Studies over the past several years suggest competition for food is affecting salmon runs up and down the West Coast, from Puget Sound chinook to Bristol Bay, Alaska, sockeye. In some instances, the fish are smaller when they return, making them more susceptible to predators. In others, runs are actually declining.

The competition between wild and hatchery salmon is nothing new. Wild salmon are considered heartier and more resistant to disease than their hatchery-raised counterparts.

If the salmon you buy at the fish counter isn't farm-raised, it's likely hatchery-raised silver, coho or chinook. Fishermen are expected to toss back any wild ones they catch. Before a salmon is released from a hatchery, one of its fins is clipped to distinguish it from wild ones. The fins can be clipped by hand or using a laser device.

"We know stocks from all over the Pacific intermingle and overlap," Ruggerone said. "There is a melting pot. But there is a lot we don't know."

The issue of too many salmon and too little food is an international one, with Japanese hatcheries releasing mostly chum salmon, which are valuable for their roe, and the Russian releasing pink salmon.

"Five years ago at a conference in Russia, a guy stood up and said I was trying to start a war between Russia and the U.S.," Ruggerone said.

Since the mid-1970s, the waters of the North Pacific have been slightly warmer, creating an upwelling that brings zooplankton, krill and other salmon food favorites to the surface. But a 20- to 30-year weather cycle known as the Pacific decadal oscillation could soon reverse itself, and colder waters means less food for the salmon.

Climate change is causing even greater uncertainty.

"This concern about competing for limited resources may become considerably more acute if the North Pacific area occupied by salmon decreases due to climatic change," according to an article co-authored by Ruggerone and Peterman published this fall in a technical journal published by the American Fisheries Society.

The article talks about a "common pool" of salmon food in the North Pacific and suggests hatchery fish have become so abundant that there may not be enough food for the wild fish.

Despite years of study, salmon remain pretty much a mystery fish when it comes to the time they spend in the ocean. While much is known about the time they spend in fresh water and their journey down rivers and streams to the sea, once they enter salt water they pretty much disappear for up to three years, only to return to fresh water to spawn.

Pink salmon, the most abundant type of salmon, could be the main culprit when it comes to competition for food. While some juvenile salmon stocks linger in fresh water for a year or more, pinks rush to the ocean where they have first crack at the food and return a year later to spawn.

Scientists know Pacific salmon can migrate thousands of miles once they enter the ocean. Studies of fish that had been tagged at the hatcheries and later caught have shown the fish are capable of traveling remarkable distances. But most of the studies date to the 1960s and 1970s, and scientists now want to use genetic testing to better track their journeys to the North Pacific feeding grounds.

"We have some idea what is going on, but there is a lot we don't know," Ruggerone said.

During the past several years, Ruggerone said, one West Coast salmon run had roughly three times as many fish return as expected and only a tenth of the fish expected in another run showed up. No one knows why.

"The thing about science is every answer generates 10 more questions," Ruggerone said.

**More information:**
Washington Department of Fish and Wildlife:

wdfw.wa.gov/

North Pacific Anadromous Fish Commission:

www.npafc.org/new/index.html

U.S. Fish and Wildlife Service:

www.fws.gov/species/species(un … counts/bio_salm.html