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Parasites in Fish Farms Threaten Salmon, Researchers Say

By [CORNELIA DEAN](#)

Parasites that breed in fish farms kill so many juvenile wild salmon that they threaten the survival of fish populations in some rivers and streams, Canadian researchers are reporting.

The researchers studied pink salmon in an area north of Vancouver Island, British Columbia. But they said their findings, and earlier studies of the effects of farm-borne parasites on wild salmon, are so damning that they challenge the practice of net-pen aquaculture over all. In these farms, fish grow in anchored underwater cages that function as feedlots. The parasitic sea lice prey on juvenile wild salmon when they swim past these fish pens on their way from inland rivers to the ocean.

The researchers, from the University of Alberta and elsewhere, are reporting their findings in Friday's issue of the journal *Science*.

But not everyone accepts this view of sea lice. According to Fisheries and Oceans Canada, a government agency responsible for developing aquaculture while safeguarding wild fish stocks, "no direct cause and effect" has been established between sea lice prevalence and salmon mortality. The agency says sea lice prevalence is "a complex ecosystem puzzle" in need of further study.

Brian Riddell, an ecologist with the agency, said in an interview that factors including fishing practices, logging and [climate change](#) can affect salmon abundance and added that it would be a mistake "to become overly focused on a single point."

The researchers concede their calculations show juvenile salmon death rates from sea lice infestation can range widely, but said they were typically about 80 percent. At that rate, they calculated that some local populations will be effectively extinct in four salmon generations — about eight years.

"If nothing changes, we are going to lose these fish," said Martin Krkosek, a fisheries ecologist at the University of Alberta who led the work.

Ray Hilborn, a fisheries biologist from the [University of Washington](#) who was not involved in the study but is familiar with its findings, called the data persuasive and said they raise "serious concerns about proposed aquaculture for other species such as cod, halibut and sablefish."

"These high density fish farms are natural breeding grounds for pathogens," not necessarily limited to sea lice, he said in an interview. He noted, however, that the study involved pink salmon, not species like sockeye or chinook, which are usually larger, and presumably less vulnerable to sea lice. Pink salmon are the most abundant salmon species in the northern Pacific.

The researchers, from the University of Alberta and elsewhere, said they used Canadian government fishing data

from 1970 to the present on pink salmon (*Oncorhynchus gorbuscha*) to construct models of fish abundance in the Broughton Archipelago, an area that has seen dramatic increases in fish farms.

Sea lice normally occur in the open ocean, where they bite fish and feed on them, creating open lesions that can interfere with the fishes' osmotic balance with seawater. In nature, juvenile salmon do not ordinarily encounter them until they are large enough to survive a modest infestation. But the parasites proliferate in fish pens, which are typically placed in near-shore areas juvenile fish must traverse on their way to sea.

As these and other researchers have previously reported, the young fish, small and thin-skinned, can become so heavily infested they turn into secondary sources of infection when they reach the ocean, before succumbing to the parasites themselves. But this study is the first to predict such large scale losses of wild fish from farm-bred sea lice.

Mark Lewis, a mathematic ecologist at the University of Alberta and another of the researchers, said in a statement issued by the university that containing the farms in closed pens or moving them offshore, away from rivers, might reduce the problem.

Dr. Riddell said the Canadian government is working with fish farmers to reduce sea lice infestations. One idea, he said, is to feed the penned fish medicated food. "That is something we know can be effective," he said. But, he added, that approach raises other environmental concerns. "Anything not taken up by the fish goes to the bottom of the ocean or can leach into the water, potentially affecting other marine life," he said.

Daniel Pauly, a fisheries researcher at the University of British Columbia who was not connected to the work, said in a statement that if fish farm entrepreneurs do not act to reduce sea lice infestations they will, in effect, shift the cost of their operations "on the wild salmon and the public."

The authors of the new report said their findings show action should be taken quickly. It might take 10 salmon generations to accumulate large sets of data on the effects of farm-related parasite infestations, they said in their report, and that "greatly exceeds the predicted time to extinction."

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