

## Sea Lice From Fish Farms May Wipe Out Wild Salmon

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for [National Geographic News](#)

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Four years from now wild pink salmon may vanish from Canada's Broughton Archipelago, a new study warns.

The killers, according to the research, are sea lice from fish farms.

Scientists previously demonstrated that juvenile wild pink salmon often catch [lethal sea lice infestations](#) when they swim through areas where salmon are raised in open-net farms.

Now for the first time researchers have used a data-driven model to calculate the impact on the wild salmon population.

"It's severe," said Martin Krkosek, a fisheries ecologist at the University of Alberta in Edmonton, Canada, who led the study.

(Krkosek is a [National Geographic Society Expeditions Council](#) grantee. The National Geographic Society owns National Geographic News.)

According to the data, the current rate of decline will take the salmon from their historical abundance to extinction in eight years, or four generations. The decline started two generations ago.

"We're halfway there," Krkosek said. "There's only two generations left before these fish are gone."

But a fish-farming industry representative said the analysis is flawed, and a university scientist said the conclusion reaches too far.

The stakes for the industry are high, noted another university scientist independent of the study—the findings could shut it down.

### Exposed vs. Unexposed

Sea lice are naturally occurring parasites that latch on to mature fish in the open ocean and feed on their skin and muscle tissue.

Scaly armor protects most adult fish from serious harm.

When the adults swim past the fish farms en route to their spawning grounds upriver, some parasites jump ship and infect the farms. And there their numbers explode, Krkosek said.

The Broughton Archipelago, a group of islands about 260 miles (420 kilometers) northwest of Vancouver, British Columbia, is home to about 20 active fish farms, each raising between 500,000 and 1.5 million fish.

Later, as the finger-size juvenile salmon swim downriver past these farms and out to sea, the sea lice latch on to them, the researchers said. In younger fish the lice create lesions and open sores that often prove lethal.

According to the new study, which appears in this week's issue of the journal *Science*, sea lice have decimated as many as 80 percent of the annual pink salmon runs in the Broughton Archipelago since 1970.

Krkosek and colleagues collected data on the number of wild pink salmon that return to seven rivers in the archipelago and compared their results with data from 64 farm-free rivers just north of the islands.

They ran the data through a widely used fisheries model that calculates population growth rates.

A positive rate is a sign of a healthy population; negative means the population is declining and that extinction probability is 100 percent, Krkosek explained.

"All that's left to measure is how long that's going to take," he added.

Before the sea lice infestations, which began four years ago, both regions supported productive wild pink salmon populations and active commercial fisheries, the data revealed.

"When the sea lice infestations began in the Broughton, you see an immediate collapse in the pink salmon populations," Krkosek said.

In the area to the north the pink salmon population remains healthy today. The only difference between the two regions, Krkosek added, is the fish farms.

### **High Stakes**

Rosamond Naylor is an aquaculture specialist at Stanford University's Woods Institute for the Environment in California. She was not involved in the study.

Despite the short time period of analysis, she said, "the results hold up well, and it is really a scary result."

Scott McKinley, an environmental physiologist at the University of British Columbia in West Vancouver, directed the scientific committee for the now disbanded AquaNET, a government-funded aquaculture research group.

According to McKinley, the analysis overstates the importance of the data.

McKinley noted that the Broughton Archipelago sits near the southern edge of the pink salmon distribution range, which means the population there is likely to fluctuate.

He also said the study fails to report infection rates from the fish farms, making it difficult to determine whether the sea lice infestations result from the farms or from parasites that occur naturally in the wild.

"Sea lice typically hover around the coastal areas, and I'm sure they've adapted to know when the salmon are coming on site," he said.

McKinley said a stronger cause-and-effect relationship needs to be developed before the industry is forced to change or close.

"You could end up costing somebody a lot of effort and money to do something about it when we could be going in the wrong direction," he said.

David Clare Backman is the environmental compliance director for salmon-farming company Marine Harvest Canada in Campbell River, British Columbia. He questioned the data used in the study.

For example, he said, the levels of pink salmon returning to the Broughton Archipelago as a whole in 2006 and 2007 were on par with normal returns over the last 30 years.

"But you wouldn't see that from the data they used," he said. For example, Backman questioned a river left out in the model.

Krkosek and colleagues excluded the river, which has a spawning channel that boosts productivity, to avoid confusing "our estimates of natural changes in abundance," the study authors wrote in *Science*.

But this river accounts for 40 to 90 percent of the fish that return to the Broughton Archipelago each year, Backman said.

"When you take it out, you're left with a lot of rivers that are understandably lesser contributors," he added.

And some of those rivers, he noted, may have lower pink salmon populations due to factors such as stream damage caused by landslides or debris jams from past logging operations.

Krkosek, however, says that sea lice are the one factor all declining populations share.

Wild salmon are dying out in the river excluded from the study too, but enhanced production from the spawning channel obscures the impact, he said.

Stanford University's Naylor added that the data indicate pink salmon populations start to recover in rivers where the fish farms have been idled.

"This is an important paper for the industry, because it's exactly the kind of study that could shut them down," she said.

Wild pink salmon are a vital link to the regional ecology and economy, supplying nutrients to eagles and bears and dollars to commercial fishers and the tourism industry, Krkosek said.

"Things are happening very fast," he said, "and some kind of change is needed to turn this around."

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