

"Perfect storm" brought sea louse epidemic to BC salmon—likely due to high temperatures and uncoordinated treatment

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High ocean temperatures and poor timing of parasite management likely led to an epidemic of sea lice in 2015 throughout salmon farms in British Columbia's Queen Charlotte Strait, a University of Toronto-led study has found.

The [sea lice](#) spread to migrating juvenile [wild salmon](#), resulting in the highest numbers of sea lice observed on wild salmon in a decade.

In spring of 2015, a team of U of T ecologists led by postdoctoral researchers Andrew Bateman and Stephanie Peacock found that more than 70 per cent of fish the team sampled in the Strait's Broughton Archipelago had at least one sea louse: the highest prevalence of such parasites since 2005.

"It was sort of a perfect storm of environmental conditions and mismanagement of treatment," says Peacock, a [postdoctoral fellow](#) in the U of T's Department of Ecology & Evolutionary Biology when the research was conducted. "A lot of people talk about how sea lice are natural, but in farms, you have these parasites in larger numbers. Juvenile wild salmon are then exposed as they migrate past these areas."

Because farmed salmon are in open net pens and share water with nearby wild salmon, the parasites can transmit to young wild salmon who wouldn't normally encounter sea lice until later in life. These young fish

are sometimes as small as three centimetres in length, while sea lice themselves can be close to one centimetre in diameter.

"Getting sea lice at such an early age affects young salmon's health and their ability to fend off predators," says Peacock.

Based on the numbers of lice on juvenile salmon in 2015, researchers predicted an additional 9 – 39 per cent decline in returning pink salmon due to the outbreak.

In order to determine the cause of this outbreak, the team assessed the evidence for four contributing factors:

- influx of lice on returning adult pink salmon
- sea surface temperature
- the timing of chemical treatments to control sea lice on [salmon farms](#)
- resistance of sea lice to chemical treatment on farms

"Even though parasite treatments on farms were effective, we saw that treatments failed to protect wild salmon, and this happened at a time of unexpected warming in ocean water in these regions," says Martin Krkosek, assistant professor in U of T's Department of Ecology & Evolutionary Biology. Krkosek was Bateman's and Peacock's supervisor and study co-author.

The fall of 2014 did have a healthy return of adult pink salmon, bringing sea lice into near-shore waters where they could infect farmed salmon. High ocean temperatures during winter months then likely accelerated sea-louse development, enabling populations to grow quickly and reach higher numbers than they would under normal ocean temperatures.

Also in 2015, individual salmon farms did not coordinate anti-louse

treatments, with some farms delaying treatment until just prior to the time when juvenile salmon migrate past farms. As a result, sea lice from those farms could have spread to adjacent farms, hampering area-wide control of the outbreak.

"Furthermore, during the juvenile wild salmon migration, farms are supposed to treat for sea lice within 15 days of when a threshold number of lice are found on adult farmed salmon," says Peacock. "But in 2015, some farms waited several months before they treated."

"The strategy might have been 'wait until the migration to treat' but it kind of backfired because the louse populations were allowed to grow in the meantime, and the lice spread to other nearby farms. It likely created a bigger problem down the road."

"We were surprised to see that some farms don't seem to be following their license conditions," says Peacock. "We thought maybe there were more infractions in 2015 that may have led to higher numbers of sea lice, but when we looked back over 10 -15 years, the rate of such infractions was about the same. The big difference in 2015 really seems to be the combination of a lack of proactive parasite treatment and higher water temperatures."

The team suggested the solution to such an outbreak in the future would likely be an earlier, coordinated parasite treatment effort between [salmon farms](#) – something the researchers say is lacking in this area and across the country.

"Sea lice used to be a problem a decade or so ago, then parasite management changed and it seemed like the problem had been effectively managed for several years. Then it wasn't managed well all of a sudden," says Krkosek. "This is a lesson about the importance of better coordinating and timing regional treatment and being aware of warming

ocean temperatures."

The results of the team's study appear in a paper published in the July edition of the *Canadian Journal of Fisheries and Aquatic Sciences*.

Provided by University of Toronto

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