



## Independent researchers track salmon farm virus in biological waste

New method allowed monitoring of foreign salmon virus in Washington State and British Columbia salmon farms

**November 22, 2022, For Immediate Release:** Lack of access to salmon in farms has impeded research into the impact of disease transmission from salmon farms to wild salmon. To address this a group of researchers developed a novel approach. Using a fine net, they captured fragments of farm salmon waste including tissue, scales and feces drifting out of the net pens. These samples were tested for the Atlantic virus, Piscine orthoreovirus (PRV).

The study published in the Canadian Journal of Fisheries and Aquatic Sciences revealed the majority of salmon farms are shedding the virus PRV via their biological waste. [Link to Study](#)

Previous research indicates [wild salmon exposed to salmon farms become infected](#) with PRV. Mounting evidence suggests this disease is a risk to wild salmon. While PRV causes heart disease in Atlantic salmon, it has been linked to a blood disease in Pacific salmon which results in the rupture of red-blood cells leading to kidney and liver damage.

2018-2020, with assistance from [Clayoquot Action](#), [Wild Fish Conservancy](#) and the [Sea Shepherd Society](#), farm salmon waste was collected from 56 farms owned by five different companies (Mowi, Cermaq, Grieg, Creative Salmon and Cooke Aquaculture) across BC and Washington State. Seventy-percent of the samples tested positive for PRV. PRV was also detected in bloodwater released into the ocean from farm salmon processing plants off Campbell River and in Tofino (See Map).

Sequencing of the viral genomes revealed that PRV in the waste collected near Atlantic salmon farms is related to a lineage of the virus commonly detected in both farmed and wild salmon in British Columbia. The sequencing data found that the lineage of PRV was often similar in farms owned by the same company. This suggests freshwater salmon farm hatcheries may have been a source of the infection. Additionally, the study corroborated a [previous genomic surveillance](#) finding that the PRV infecting Chinook salmon farms off Tofino is distinct from the virus which infects the majority of Atlantic farms. Chinook farms share the same lineage of PRV typically found in Chinook salmon from Columbia River hatcheries. Of concern, this study also documented genomic variation not previously been detected in the region; evidence that the virus is mutating on salmon farms.

“I saw birds, crustaceans, herring and juvenile salmon actively feeding on the same bits of flesh and fat I was collecting,” says Alexandra Morton. “This means the animals attracted to the farms are at risk of picking up this foreign virus and carrying it far beyond the farm tenures

through the ecosystem. The potential for salmon farms as virus super-spreaders could not have been clearer.”

“In Norway, where PRV originates, scientists think the high infection rates on salmon farms led to the evolution of a more harmful strain,” said Dr. Gideon Mordecai, a viral ecologist at the Institute for the Oceans and Fisheries at UBC. “Here in BC, we know that the virus is continually mutating and being transmitted to wild salmon from farms, so having a method to independently monitor the evolution of this virus is important for managing the health of wild Pacific salmon”.

## Background

Our understanding of PRV has improved significantly since the virus was [first discovered](#) in Norway in 2010 and identified as the cause of a farm salmon disease sweeping the Norwegian coast since 1999. PRV is now internationally recognised as the [causal agent of Heart and Skeletal Muscle Inflammation](#) (HSMI) in Atlantic salmon.

Thirty [million Atlantic salmon eggs](#) were imported into BC by the salmon farming industry prior to 2010, thus none were screened for PRV. Analysis of viral genomics, estimates that the virus was introduced to the North East Pacific from the Atlantic approximately 30 years ago ([Mordecai et al 2021](#), [Kibenge et al 2013](#)), when Atlantic salmon farming began in BC.

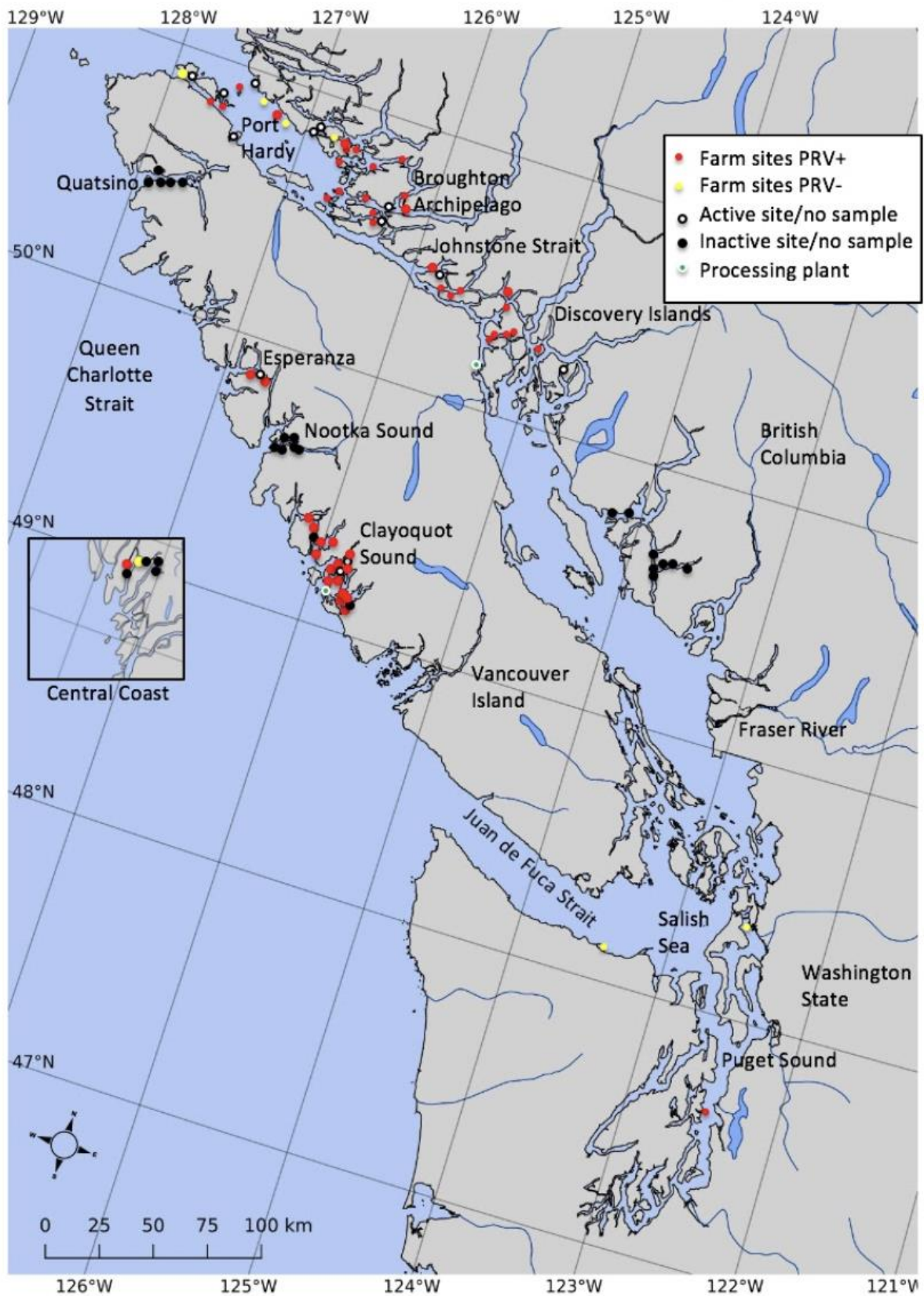
[Documents submitted to Federal Court by](#) Mowi (formerly Marine Harvest) in 2017, reveal they knew PRV was in their hatcheries (pgs. 81, 82, 197). The company made the case they should be allowed to transfer PRV-infected salmon smolts into marine farms on the BC coast. DFO agreed to permit this. [Peer reviewed literature](#) has confirmed PRV in farm salmon hatcheries. More recently, the salmon farming industry claims that enhanced sterilisation of eggs has resulted in their hatcheries being PRV free. However, at the time of publication, there is no published data to confirm this claim.

Widespread PRV infection in BC salmon farms concerns researchers as viruses in feedlot environments are known to mutate into higher virulence strains, a process which has already occurred with PRV on salmon farms in Norway ([Dhamotharan et al. 2019](#); [Mordecai et al. 2021](#)) and appears underway in British Columbia.

Using [correlational analyses](#), BC researchers are seeing links between PRV infection in wild Chinook and Coho salmon to poor body condition and lower survival, suggesting transmission of PRV from farms to wild fish may have a population level impact.

**Dr Gideon Mordecai** (Research Associate at the Institute for the Oceans and Fisheries, University of British Columbia) is the lead author who analysed the viral sequencing data. Gideon is available for interview ([gidmord@gmail.com](mailto:gidmord@gmail.com), 778 680 8545).

**Alexandra Morton**, who led the study is available for interview ([Alexandramorton5@gmail.com](mailto:Alexandramorton5@gmail.com) 250 974 7086).



PRV was detected in every region where samples of farm salmon waste were collected. Washington State has recently ordered removal of all fish farms.



Alexandra Morton collects samples of farm fish tissue, scales and feces with a fine mesh net for virus testing. Photo courtesy of Sea Shepherd Conservation Society.



Tissue sample collected outside salmon farm inserted into a preservative prior to testing. Photo courtesy of Sea Shepherd Conservation Society