SALMON FARMING IS GOING VIRAL: DISEASE EDITION

SeaChoice.org
for healthy oceans

Disease spread from open net-pen salmon farms threaten wild fish populations across Canada.

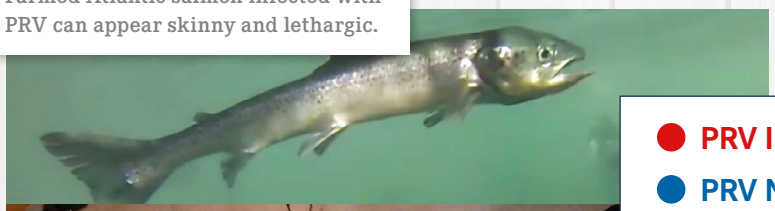
Canada's sea-cage fish farming industry has a disease problem[1 2 3]. With salmon or trout crammed together by the thousands, viruses can spread like wildfire through open net-pen aquaculture sites. Beyond the net-pens, highly contagious diseases bred at fish farms can infect wild species. At the grocery store, fish culled after viral outbreaks are sold without notice to consumers, so long as they are not considered a risk to human health. As the ills of open net-pen fish farming continue to persist on both the Atlantic and the Pacific coasts, we're calling on our leaders to work towards a transition away from open net-pens across Canadian waters. This briefing explores two of the reasons why.

A CLOSER LOOK AT DISEASE: PISCINE ORTHOREOVIRUS (PRV)

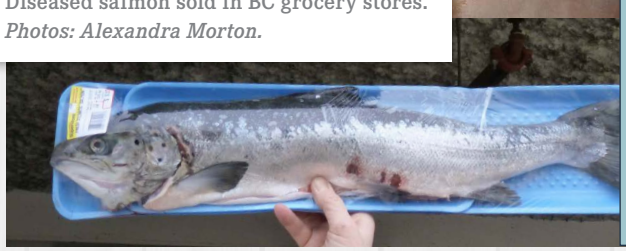
Concern for wild Pacific salmon populations spiked on Canada's West coast when salmon stocked at B.C. open net-pen farms were found to be infected with Piscine Orthoreovirus, commonly known as PRV[4]. In Atlantic salmon populations, PRV attacks red blood cells and vital organs, including the heart. Infection can kill farmed fish directly through the onset of a disease called heart and skeletal muscle inflammation (HSMI). In other salmon species, the virus expresses as similar diseases, referred to as jaundice/anemia or "HSMI-like disease". Impacts have been recorded in Atlantic, Chinook and Coho salmon raised on farms and on experimentally infected wild salmon[5 6 7 8].

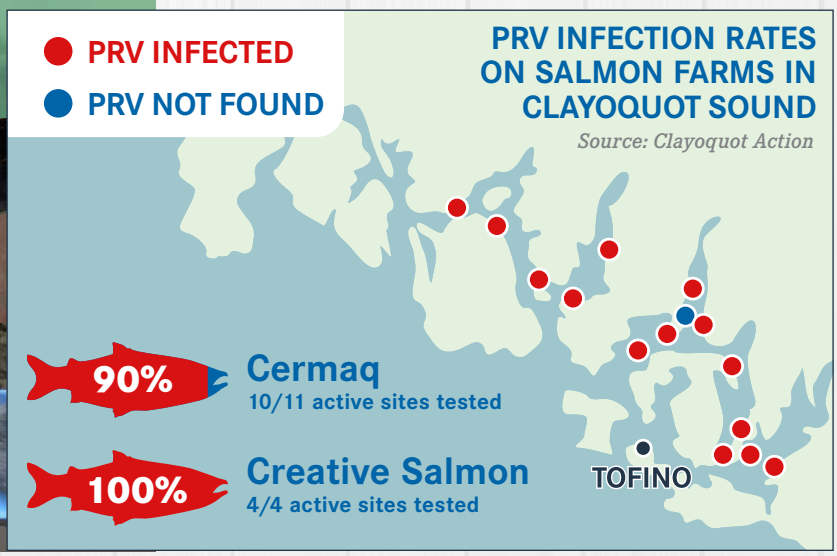
PRV can produce lesions and large discolourations in the abdominal muscle tissue of Atlantic salmon, even when fish appear otherwise "normal" on the outside[9]. *Photos: adapted from Bjørgen et al., 2015.*

Farmed Atlantic salmon infected with PRV can appear skinny and lethargic.



Diseased salmon sold in BC grocery stores. *Photos: Alexandra Morton.*





PRV IS "UBIQUITOUS" AT OPEN NET-PEN SALMON FARMS

First noticed at a single salmon farm in Norway in 1999, soon **spreading to 419 farms** across Norwegian waters by 2010[10].

PRV is now considered "**ubiquitous**" at open net-pen salmon farms[11].

Mortalities up to 20 percent of farmed stocks have been documented on Norwegian salmon farms[12].

HOW CAN FARMED SALMON TRANSMIT PRV TO WILD SALMON?

PRV can **survive without a host** in the seawater surrounding open net-pen sites, enabling at-sea transmission to wild salmon stocks[13].

Infected salmon can shed up to **65 billion viral particles** an hour[14].

Strong B.C. currents spread viral particles throughout **salmon migration routes**[15].

Fish breathe by passing water through the gills, where the **virus can transfer** to their bloodstream[16].

PRV IS THREATENING WILD SALMON POPULATIONS IN B.C.

Open net-pen sites operate throughout important **wild salmon habitat** in B.C.

In 2019, PRV was present at **14 of 15 farmed Chinook sites** tested in B.C.'s Clayoquot Sound[17].

93%

Wild and farmed salmon share the same viral strains in B.C., suggesting **regular transmission**[18 19].

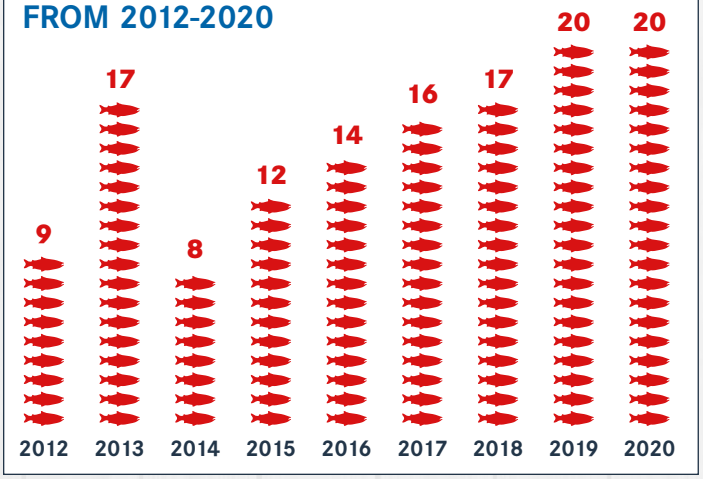
PRV infections are occurring in the Clayoquot Sound **UNESCO Biosphere Reserve**, where wild Chinook salmon populations are collapsing[20].

PRV is strongly associated with ruptured blood cells and organ failure in Chinook salmon, a disease referred to as **jaundice/anemia**[21].

A CLOSER LOOK AT DISEASE: INFECTIOUS SALMON ANEMIA (ISA)

On the Atlantic coast, farms struggle to control the spread of Infectious Salmon Anemia (ISA), an often-deadly influenza virus that attacks a salmon's organs or gills and contaminates its blood cells. ISA was first identified on a New Brunswick salmon farm in 1996 and has since been detected in farmed and wild salmon stocks throughout the Atlantic provinces[22 23]. In Canada, mass ISA-induced culls are common. To reduce industry losses, market-size infected fish are permitted to be sold to Canadian retailers for consumption. The United States, Canada's largest salmon buyer, will not buy ISA-infected salmon as U.S. law prohibits the import of any diseased animal for health and safety reasons.

NUMBER OF ISA OUTBREAKS ON ATLANTIC CANADIAN SALMON FARMS FROM 2012-2020



An ISA-infected salmon the showing skin hemorrhaging typical of the virus. *Photo via Aquaculture North America.*

THE DEADLY TRUTH ABOUT ISA ON ATLANTIC CANADIAN FISH FARMS

Mortality rates can vary during outbreaks, with severe cases **killing up to 90 percent of farmed fish** when action is not taken immediately[24].

ISA can live for a short time outside its host; New Brunswick's strong tides appear to play a role in the transmission of the virus in the Bay of Fundy[25].

European viral strains have been identified in wild Atlantic salmon in North America, but more research is required to determine transmission pathways and population level impacts.

ISA OUTBREAKS CANNOT BE PREVENTED

Culling and early harvest represent the only ISA prevention mechanisms currently known to halt widespread transmission at salmon farms.

A 2020 outbreak in Newfoundland resulted in the **culling of 450,000 salmon** in a single incident[26].

SeaChoice is calling for the transition away from open net-pen salmon farms in all Canadian waters.

PRV and ISA represent just two of a handful of emergent and intractable diseases now pervading open net-pens salmon farms across the world. In Canada, diseases at net-pen sites continue to threaten wild salmon stocks and other vulnerable marine species. Many are beginning to recognize that there is no way to effectively defend wild fish against threats from disease while sustaining the open net-pen industry. In short, there is no right way to do the wrong thing. As wild stocks continue to dwindle, we must align science, commitment and political action. Fisheries and Oceans Canada has a duty to preserve Canada's iconic and cherished wild salmon populations, as well as other species threatened by the open net-pen industry across Canadian waters.

WE URGE A CONTINUED COMMITMENT TO THE REMOVAL OF OPEN NET-PEN FINFISH FARMS ON CANADA'S PACIFIC COAST BY 2025 AND SIMILAR TRANSITION COMMITMENTS FOR CANADA'S ATLANTIC COAST.

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