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Salmon: the telling relationship between PRV and HSMI - Ray Grigg

The recent documentation of heart and skeletal muscle inflammation (HSMI) in BC's farmed salmon has been treated in cautious and evasive terms by the industry and government.

Then-Minister of Fisheries & Oceans Hunter Tootoo noted that HSMI 'might' have been found and that it's 'yet another piece in the complex puzzle of salmon health on the Pacific Coast.' Jeremy Dunn, executive director of the BC Salmon Farmers Association, also downplayed the significance of the announcement. He commented, 'The findings announced by the Strategic Salmon Health Initiative regarding a potential diagnosis of heart and skeletal muscle inflammation in fish from one Atlantic salmon farm in BC are important. However, there is no consensus amongst the scientific community about the finding as the fish sampled in this farm *showed no clinical signs of the disease*' (italics added).

For this very reason, the discovery of HSMI is extremely significant—understanding why requires some additional information. HSMI is related to piscine reovirus (PRV) in the way that AIDS (acquired immune deficiency syndrome) is related to HIV (human immunodeficiency virus).

Salmon don't get HSMI unless they have PRV. Just as HIV is asymptomatic, PRV is also asymptomatic—which explains why it is not technically called a 'disease'. In its early stages, HSMI may also exhibit no 'clinical signs of disease'. But it can be fatal in the end.

Heart and skeletal muscle inflammation is the symptomatic stage of piscine reovirus. As the degree of PRV infection increases, heart muscles are damaged, organs are impaired and muscles are compromised. Eventually fish are so debilitated by a weakened heart, malfunctioning organs and inflamed muscles that they are unable to swim.

PRV is extremely infectious. First identified in Norway in 1999, it spread quickly to 417 farms, and in 2010 was identified by Norwegian scientists as the cause of HSMI. The scientific journal, *PLOS One*, established the link in its article 'Heart and Skeletal Muscle Inflammation of Farmed Salmon is Associated with Infection with Novel Reovirus'.

HSMI is now the third largest cause of mortality for salmon farming in Norway. But this is the industry's problem. The real environmental concern is the spread of PRV and thus HSMI to wild salmon.

PRV eventually spread to BC, probably by infected eggs imported to salmon farms from Norway. As early as 2008 reports from BC's veterinarian pathology lab showed 'congestion and hemorrhage in the stratum compactum of the heart' of farmed salmon, symptoms consistent with HSMI.

Estimates are that most farmed salmon in BC now have PRV—not a serious problem for fish farmers if their fish don't die of HSMI.

But the situation is very different for wild salmon. Piscine reovirus imported from Norway is now thought to be spreading to BC's wild fish. As early as 2011, Dr Kristi Miller found PRV in Fraser River sockeye. A year later, 13 of 15 Cultus Lake cutthroat trout were found with PRV.

Norwegian scientists are of the opinion that HSMI may never be discovered in wild salmon because the fish would be too debilitated by the disease to survive predators and the challenging conditions of oceans and rivers.

The combination of PRV's ubiquitous presence in salmon farms, its extreme virulence, and the fatal symptoms of HSMI could have devastating consequences for wild salmon populations. ✍

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