

Red Vent Syndrome - a disease of wild Atlantic salmon

Red Vent Syndrome (RVS) is a condition of wild Atlantic salmon (*Salmo salar*) returning to rivers to spawn. The vent of affected fish becomes inflamed, red and swollen. The condition was first seen by Environment Agency staff conducting index river monitoring on the river Dee, Wales in 2004. RVS has since been reported in England, Scotland, Ireland, Norway and Canada. There has been a significant increase in the incidence of RVS since 2004, with a peak of approximately 50% of returning salmon affected by the condition in some rivers.

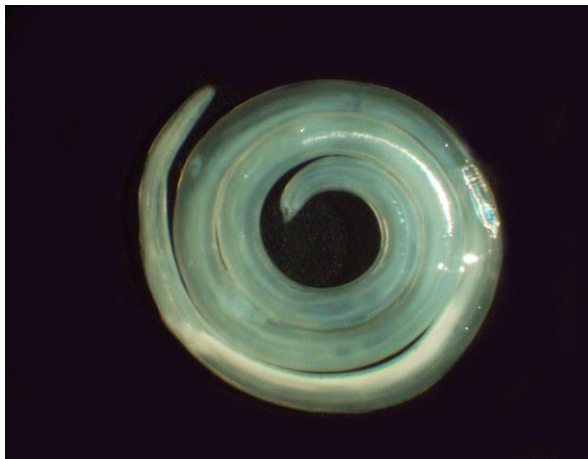


Red Vent Syndrome in an Atlantic salmon

Monitoring RVS

We have been monitoring RVS in England and Wales to establish the numbers of affected salmon, the distribution, the cause of the disease and its impact on salmon stocks. Our findings have been shared with colleagues at Marine Scotland, who have been doing similar monitoring for Scottish salmon populations. A joint RVS field guide has been produced to help consistently record vent observations. This is available from our website and can be used to report any fish you catch with swollen or bleeding vents.

A new disease from a common parasite?



The parasitic nematode Anisakis simplex

RVS is a condition that develops when salmon are at sea. We believe it is caused by a parasitic nematode worm called *Anisakis simplex*. These parasites are commonly found within the body of salmon that have returned to freshwater, but these are usually found on the gut and internal organs. It is only in recent years that large numbers of parasites have been found within the vent tissues of salmon. *Anisakis* infection causes considerable damage to the vent and provokes an inflammatory response from salmon. Work is underway to establish the importance of these infections and whether other pathogens or causes may be responsible for this condition.

Life cycle of *Anisakis simplex*

Anisakis simplex matures in marine mammals but infects a wide range of fish species as an intermediate host. Fish gain these worms by eating infected crustaceans and other

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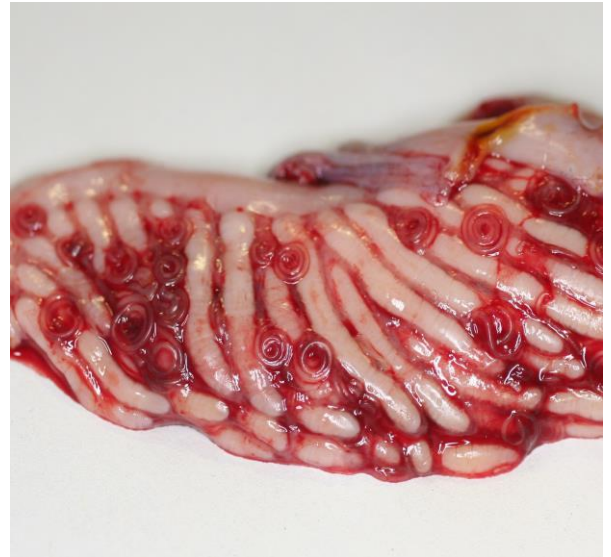
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invertebrates which serve as a first intermediate host. It is possible that changes in the marine environment, such as warming sea surface temperatures, have influenced the life cycle of this parasite, in turn altering infections in salmon feeding at sea.

What is the impact of RVS on Atlantic salmon?

In severe cases, RVS can be very unsightly and can reduce the aesthetic, recreational and commercial value of affected fish. We have no evidence that RVS kills salmon, or that the condition disrupts the normal spawning of affected fish. Our detailed parasite examinations, combined with field and laboratory investigations are helping clarify the relationship between Anisakis and vent damage. RVS can vary from subtle abnormalities to large open lesions. However, these studies have confirmed that salmon heal once in freshwater, which suggests that marine influences are important to this disease. We are investigating whether healed fish retain any underlying problems that could affect their health, condition or ability to reproduce.



Anisakis worms covering the gut of a healthy Atlantic salmon

Monitoring of RVS and research efforts



Detailed examinations of fish with RVS help establish the cause and impact on our salmon

Our trapping programmes on the rivers Tyne, Tamar, Dee, Lune and Caldw have provided a consistent measure of the incidence of RVS in England and Wales since 2005. Records of RVS have also been collected from anglers, commercial netmen and our own broodstock operations collected for our hatcheries. This has provided a valuable insight into RVS throughout whole river systems.

We are working on a collaborative research projects to improve understanding of RVS and its impact on salmon fisheries. Molecular studies have confirmed the identification and genetic variation of nematodes recovered from salmon with RVS. Collaborative studies with Southampton University are being conducted to assess whether marine feeding or location could be driving this condition.

If you experience RVS or any other disease problems at your fishery, or you would like more information, please contact National Fisheries Laboratory for advice and guidance.

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