



Red Vent Syndrome in wild Atlantic salmon

- Red Vent Syndrome (RVS) is a condition of Atlantic salmon. Affected fish have a vent which is inflamed or swollen and sometimes may even be bleeding. The condition has been seen in fish returning to our rivers to spawn since 2006. Around a third of all returning salmon have Red Vent Syndrome.
- We have been monitoring and investigating this condition in England and Wales. Our colleagues at Marine Scotland have been doing the same in Scotland.
- We are now working together to ensure a view of the condition across Great Britain. We have produced a joint field guide to ensure anglers and fishery professionals can give us a consistent record of findings. This will enable us to see how the condition is affecting fish in different parts of Britain. We have consulted anglers and fishery managers to help us develop this guide.
- Salmon are an internationally important species, ecologically, economically and culturally. We have a duty to improve and protect these iconic fish, the fisheries they sustain and the rural economies they support. Healthy stocks of salmon are important indicators of the quality of water and the habitat in our rivers.
- RVS is a disease of salmon. We monitor RVS to know how many fish are affected and to investigate what causes the condition and how it may harm stocks. Knowing this will help us understand the impact, both now and in the future, and help identify any management actions that may be taken.
- The guide (attached) will replace all earlier field guides

Update of work on Red Vent Syndrome (RVS) in wild Atlantic salmon.

Work on RVS in England and Wales has continued during 2010/2011 as part of routine monitoring by the Fisheries Technical Services, Brampton. This has been supported by the index river group. The following information summarises the areas of work underway to improve understanding of this condition and its importance to salmon fisheries.



nodyn briffio

briefing note

Monitoring of RVS

We have monitored RVS in salmon stocks throughout England and Wales for the past 4 years, using data from index river traps and brood stock collection. This information has been shared with Marine Scotland to produce a collaborative GB prevalence assessment. A trend of rising prevalence has been recorded in some rivers in England and Wales, with up to 56% of salmon affected in 2010 (mean prevalence 41%). Similar increases have been recorded in Scotland, with a mean prevalence of 43.5% across all Scottish rivers in 2009. These observations have been reported annually to ICES and were presented at the 2009 European Association of Fish Pathologists Conference, Prague. A collaborative paper on the prevalence and distribution of RVS in England, Wales and Scotland is in preparation. In order to maintain consistency in the reporting of RVS, an updated field-guide has been produced. This has been sent out to anglers, Environment Agency staff and scientists and is available [here](#).

The role of *Anisakis simplex* in causing RVS

Initial investigations indicated that RVS was caused by the parasitic nematode *Anisakis simplex*. However, examinations of salmon during 2009 revealed some inconsistencies, with some badly affected fish having low nematode numbers (and *visa versa*). These observations suggest that other, as yet unknown, factors may be contributing to the condition. Detailed studies conducted during 2010 have enabled us to test the relationship between nematode burden and vent condition, providing a robust baseline of infections in both affected and unaffected fish. This has allowed us to assess the role of *A. simplex* in the cause of RVS and also link infection characteristics with histopathology and studies involving scale microchemistry.

Evidence of healing

There is anecdotal evidence that salmon with RVS heal once they enter freshwater. This was investigated during 2010 by means of detailed histopathological investigations. This work has been achieved with help from staff on the River Tyne and Welsh Dee during brood stock collection operations on these rivers. Fish with differing vent conditions were photographed at the time of capture and then made available for examination after being stripped at the Kielder and Maerdy hatcheries. Vent lesions appeared to consistently heal in freshwater (Figure 1), despite the persistence of nematodes within the vent tissues. Studies are underway to investigate the condition of 'healed' fish to see whether any underlying abnormalities in the vent exist.



nodyn briffio briefing note



Figure 1 (a) vent of a salmon caught from the Chester Weir trap on the River Dee (head of tide) in September 2010 showing mild RVS. (b) the same salmon examined at the Maerdy hatchery in November 2010 showing evidence of healing.

Genetic identification of *Anisakis simplex*

Molecular studies have been conducted by scientists at Rome University to confirm the identification and genetic variation of nematodes recovered from salmon with RVS. Nematodes collected from salmon in the Welsh Dee and River Tyne have been analysed along with nematodes recovered from salmon in Europe and Canada. Initial results indicate that parasites recovered from the vent tissues are *Anisakis simplex simplex* and are genetically identical to those that are commonly recorded in the body cavity of salmon. Preliminary analysis of nematodes from the River Tyne, also led to the discovery of a nematode species usually found in far warmer localities. This supports the possibility that changes in the marine environment may be an influence on parasite burdens.

Scale microchemistry

RVS is a condition that develops in the marine environment. This raises difficulties when identifying possible causes for RVS. Studies involving scale microchemistry are underway at Southampton University, utilising scales collected during routine salmon monitoring and specific RVS examinations. It is hoped that this will provide some useful information on the feeding behaviour in the marine environment and differences in susceptibility of salmon to RVS. This may also help explain variability



nodyn briffio

briefing note

in the distribution of nematodes within affected fish and differences in the observed responses to infection.

Local engagement and impact on fisheries

Efforts have been made to assess the severity, importance and impact of RVS to fisheries. Anglers and commercial netmen on the River Tyne have agreed to submit data on RVS by reporting it through their respective log book schemes. Samples of affected fish from commercial netmen operating on the mouth of the River Tyne will also be examined later this year. This information will be combined with observations from previous brood stock sampling activities to provide an overview of RVS throughout the Tyne system. This local engagement will enable clear communication of outputs and help us to assess the importance and perception of RVS to those using the fishery.

Chris Rees
Fisheries and Aquaculture Management Team Leader
Arweinydd y Tim Rheoli Pysgodfeydd a Dyframaeth

Environment Agency Wales South East
Asiantaith yr Amgylchedd Cymru De - Ddwyrain
Llinell uniongyrchol/Direct dial 02920245258
Ffon symudol/Mobile phone 07795811853
Ffacs uniongyrchol/Direct fax 02920362286
E-bost uniongyrchol/Direct e-mail: chris.rees@environment-agency.gov.uk

llinell gwasanaethau cwsmeriaid
customer service line

08708 506 506

www.asiantaeth-amgylchedd.cymru.gov.uk

llinell argyfwng
incident hotline

0800 80 70 60

www.environment-agency.wales.gov.uk

floodline

0845 988 1188