

# Saprolegnia in wild salmonids

May 2018

## Project update winter/spring 2017-18

In the last few years we have received increased reports of salmon and sea trout exhibiting Saprolegnia infections. This natural, fungal-like condition occurs as secondary infections which can appear unsightly, with significant losses reported on some rivers. Little is currently known about the factors driving Saprolegnia infections and why we are seeing increased disease problems. We continue to monitor the situation on all our major salmon rivers and are working with partner organisations to progress our understanding of these infections.

## Partnership studies

National Fisheries Services (NFS), Brampton have been co-ordinating reports of Saprolegnia infections across England through our area teams, anglers and index river monitoring activities. We have also part-funded a project in collaboration with Cardiff University to improve understanding of Saprolegnia in our fisheries. This project is being run as a three year PhD with the following objectives:

1. To determine whether disease outbreaks are being caused by particular species or strains of Saprolegnia.
2. To understand how Saprolegnia obtained from different rivers and fish species behave under different environmental conditions.
3. To use environmental data combined with lab observations to help explain why some rivers and years have been worse affected than others.



## Sampling and sequencing

Thanks to the support of internal colleagues and external partners we have obtained almost 100 isolates of Saprolegnia from salmonid rivers across England. These have been sequenced to confirm the species and genetic variation between samples. Recent results suggest that *S. parasitica* is the most common species in England and that there is considerable variation in isolates between rivers.

This is the first study to characterise Saprolegnia from multiple rivers and host species. This data is currently being analysed and will provide a valuable insight into these infections. It will also allow further studies to be conducted to better understand the factors influencing transmission and impact.



## Laboratory investigations

Saprolegnia is a complex disease that is influenced by a wide range of environmental and host-related factors. As such, it is unlikely there will be a sole cause for the observed infections. Whilst there could be different stressors acting on different rivers and between years, we know that some variables are particularly important to the development of disease. These include temperature, water chemistry and also water flow rate.

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The project has progressed along three main avenues: 1) investigating the host preference of different Saprolegnia isolates; 2) determining whether different isolates differ in virulence (i.e. severity or harmfulness); 3) assessing the role of environmental factors in driving disease "outbreaks".

## Host preferences

Saprolegnia isolates have primarily been collected from salmon and sea trout, although we have also taken samples from carp, eels and sticklebacks as a comparison. Preliminary results from laboratory experiments indicate that strains of Saprolegnia differ in their host specificity (the fish species they prefer to infect). Ultimately, these data will help us better understand differences between isolates and the dynamics of infection in our fisheries.



## Differences in virulence

Preliminary results from this project suggest that Saprolegnia isolates taken from different rivers and fish species vary in virulence, with some strains being more pathogenic than others. Understanding the role of virulence is complex, and we know that Saprolegnia disease is largely driven by environmental conditions and host factors (e.g. physiology, immunology, stress, hormonal changes and mechanical damage). However, laboratory studies are underway to help us understand whether genetic differences between isolates could help to explain why some rivers are more badly affected than others. Further analysis will also help clarify the influence of environmental variables in driving genetic variation between strains of *S. parasitica*.

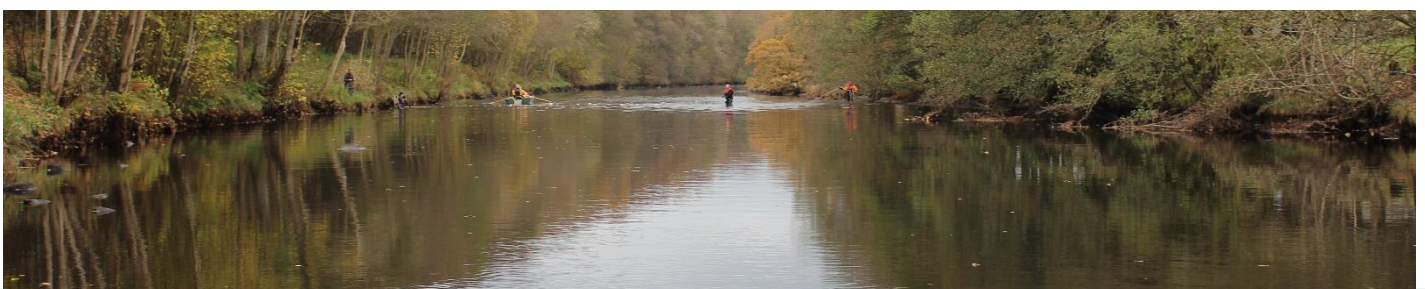
## Environmental variables

This project has helped confirm the importance of temperature and water flow rate in determining Saprolegnia levels. Laboratory based experiments are being conducted this year, looking at the effect of temperature on the growth and sporulation rates of different strains of *S. parasitica*. This will help us understand when Saprolegnia is most active and under what conditions it releases the most infective stages.

With help from our local area teams, we have now placed temperature loggers in the rivers where the greatest problems with Saprolegnia have been observed. These will provide an accurate profile of temperature throughout the year and between tidal and head water sites. These data will help identify relationships between river temperatures and observed levels of disease in returning salmonids.

## Continued monitoring

We continue to monitor the status of these infections in all our major salmonid rivers. Nationally, more reports of Saprolegnia were made in 2017 compared to 2016, but in most cases, these were within expected levels and were not cause of serious concern. An exception to this was seen in the south-west, where heavier levels of Saprolegnia were reported over the year. Please get in touch if you have any queries relating to this project, Saprolegnia in wild salmonids, or any other health problem in our fisheries. Many thanks to all those who have been involved in the project so far.



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