An eDNA-based method for monitoring a salmonid infectious disease: Development and application

Eloïse Duval‡, Simon Blanchet‡, Erwan Quéméré§, Lisa Jacquin†, Charlotte Veyssièrel, Armand Lautraite¶, Laurent Garmendia#, Allan Yotte#, Nathalie Parthuisot‖, Jessica Côté, Géraldine Loot

‡ CNRS Station d’Ecologie Théorique et Expérimentale, Moulis, France
§ INRAE UMR ESE, Rennes, France
‖ CNRS, Université Toulouse III Paul Sabatier, UMR EDB, Toulouse, France
¶ Independant fish veterinarian, Grisolles, France
# Fédération Départementale des Associations Agréées de Pêche et de Protection du Milieu Aquatique de l’Ariège, Verniolle, France

Corresponding author: Eloïse Duval (eloise.duval@sete.cnrs.fr)

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Abstract

In the current context of global change, freshwater species are increasingly exposed to emerging infectious diseases (Okamura and Feist 2011). As an example, the Proliferative Kidney Disease (PKD) has emerged in salmonid fish during the last two decades, both in Europe and North America, causing important losses in aquaculture and worrying declines of several wild salmonid populations (Sudhagar et al. 2019). It is caused by Tetracapsuloides bryosalmonae, a myxozoan parasite with a complex life cycle involving two hosts: salmonids (intermediate host) and bryozoans (primary host). As PKD development strongly depends upon water temperature and quality, it is expected that global change could lead to more outbreaks (Okamura et al. 2011). Current monitoring of fish parasite load and infection status relies on histological observation or T. bryosalmonae DNA amplification out of kidney samples, involving fish euthanasia, and thus relatively small sample sizes when inferring infection prevalence. As large-scale screening of this parasite infections are required to better understand PKD dynamics, we have developed a non-lethal method for T. bryosalmonae detection in fish host based on the biological fact that T. bryosalmonae spores can be excreted from infected fish into the water through urine (Hedrick et al. 2004). This novel approach based on the detection of T. bryosalmonae...
DNA in fish urine was developed on wild brown trout (*Salmo trutta*), a species known to be an intermediate host of *T. bryosalmonae* and for releasing infective spores (only towards bryozoan host) through urine (Okamura et al. 2011). Applying this method, we have been able to map wild brown trout infection prevalence across 50 sites at the foothill of French Pyrenees and to identify the main environmental drivers of this disease.

**Keywords**

parasitology, proliferative kidney disease, non-lethal sampling, wildlife, fresh water

**Presenting author**

Eloïse Duval

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**References**