ARPHA Conference Abstracts 4: e64796
doi: 10.3897/aca.4.e64796

Conference Abstract

A quantitative eDNA-based method to monitor spawning activity of two emblematic fish species in lake Geneva

Marine Vautier‡, Cécile Chardon‡, Chloé Goulon‡, Jean Guillard‡, Isabelle Domaizon‡

‡ UMR Carrtel-INRAE, Thonon-les-bains, France

Corresponding author: Marine Vautier (marine.vautier@inrae.fr)

Received: 22 Feb 2021 | Published: 04 Mar 2021

Citation: Vautier M, Chardon C, Goulon C, Guillard J, Domaizon I (2021) A quantitative eDNA-based method to monitor spawning activity of two emblematic fish species in lake Geneva. ARPHA Conference Abstracts 4: e64796. https://doi.org/10.3897/aca.4.e64796

Abstract

Anthropogenic pressures and more recently climatic change have increased the interest to study the impact of environmental changes on the key stages of fish life cycle. In lake Geneva, a deep peri-alpine lake, climate change and phosphorous level are known to have consequences on salmonid and percid populations, including key species for recreational and commercial fisheries, whose stocks are subject to significant fluctuations. To follow these stock variations, the spawning activity of European perch (*Perca fluviatilis*) and whitefish (*Coregonus lavaretus*) is monitored in this lake since several years using traditional methods, unfortunately mostly destructive or damaging (e.g. gillnetting and collection of fertilized eggs).

DNA isolated from the environment (eDNA) has been widely developed for the detection of specific species or whole biological communities, and this non-invasive method offers an alternative to conventional surveying tools. Until recently, the methods used for eDNA analysis (e.g. qPCR, metabarcoding) could be limited by their sensitivity, quantification limit or price, but the emergence of new methods, such as the droplet digital PCR (ddPCR), offers the possibility to quantify an absolute eDNA signal in a very sensitive way and at a lower cost.

Here, we show for the first time the applicability of an eDNA method to monitor the spawning activity of two fish species in a lake by using ddPCR.

During two spawning seasons for whitefish and one spawning season for European perch, water samples were collected every week from the subsurface, simultaneously to traditional monitoring sampling, and filtered through sterile cartridges. The eDNA was then extracted and analyzed using ddPCR, targeting the mitochondrial DNA of the two fish species.

The results demonstrate the efficiency of eDNA coupled with ddPCR to identify the timing and duration of the spawning periods, as well as the peak of the spawning activity for whitefish and European perch in Lake Geneva. This study shows that we have reached an operational level to use this non-invasive eDNA monitoring of the spawning activity of these fish species in lakes.

Keywords

environmental DNA, fish, ddPCR, monitoring, lake, spawning

Presenting author

Marine Vautier

Presented at

1st DNAQUA International Conference (March 9-11, 2021)