

Best Oral Presentation at Environ 2021 Winner Molly-Ann Williams, Dublin City University

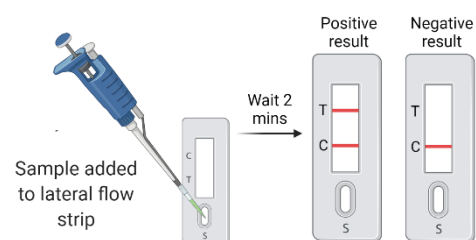
Moving from the Lab into the Field: A CRISPR-Cas Lateral Flow Approach to Environmental DNA Monitoring

In Europe, Atlantic salmon represent the primary farmed fish in terms of biomass and economic value since aquaculture production was established in the 1960s. However, although under a high level of protection, numbers continue to fall. In 2020, the Standing Scientific Committee on Salmon reported that only 45 % of Ireland's salmon rivers are meeting biologically based conservation limits, highlighting a need for simple and rapid species monitoring systems. Management and conservation of Atlantic salmon requires knowledge of distribution, traditionally gained through visual detection and counting; methods that are expensive, time consuming and potentially harmful.





My research – part of the Marine Institute Funded BEYOND2020 Project - utilises molecular approaches through the detection of genetic material released into the environment, termed environmental DNA (eDNA). This is a non-invasive method of detection, which offers a solution to some of the limitations of traditional monitoring approaches. Although promising, the majority of eDNA methodologies are limited to the laboratory setting, preventing rapid on-site detection.

We recently adapted an isothermal CRISPR-Cas based detection assay for single-species assessment of Atlantic salmon as a route to a cost-effective biosensor device. To further facilitate this assay as an on-site detection tool, we adapted our method to allow lateral flow visualisation rather than laboratory based fluorescent detection. The alterations we have made, allow a high level of sensitivity and species specificity to be maintained, whilst removing the need for complex instrumentation. This is the first time such an approach has been applied to environmental DNA monitoring.




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