DCU
Ollscoil Chathair
Bhaile Átha Cliath
Dublin City University

Water Institute

Marine

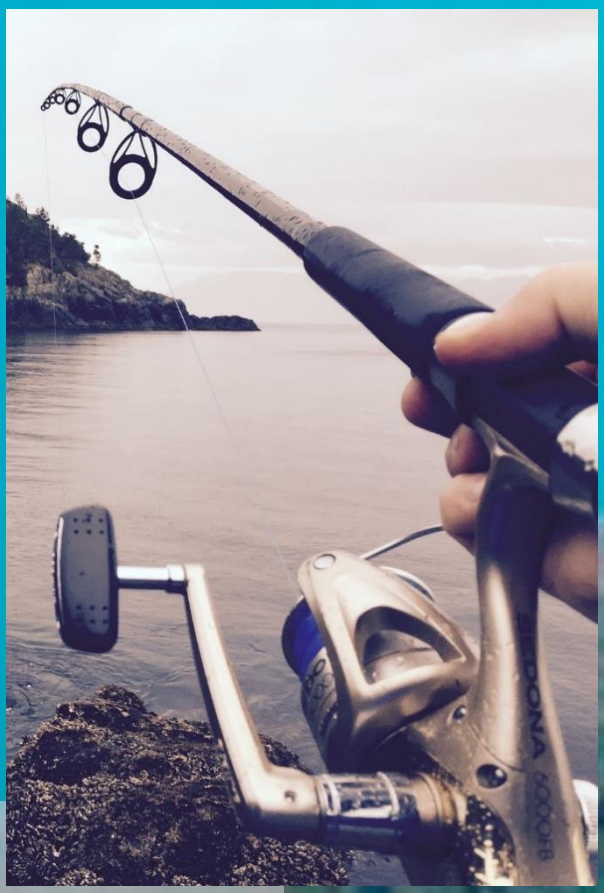
The Development of a Novel Biosensor for eDNA Detection

Researchers
Molly-Ann Williams, PhD Student
Joyce O`Grady PhD Student
Dr. Anne Parle McDermott. PI
Prof. Fiona Regan PI

INTRODUCTION

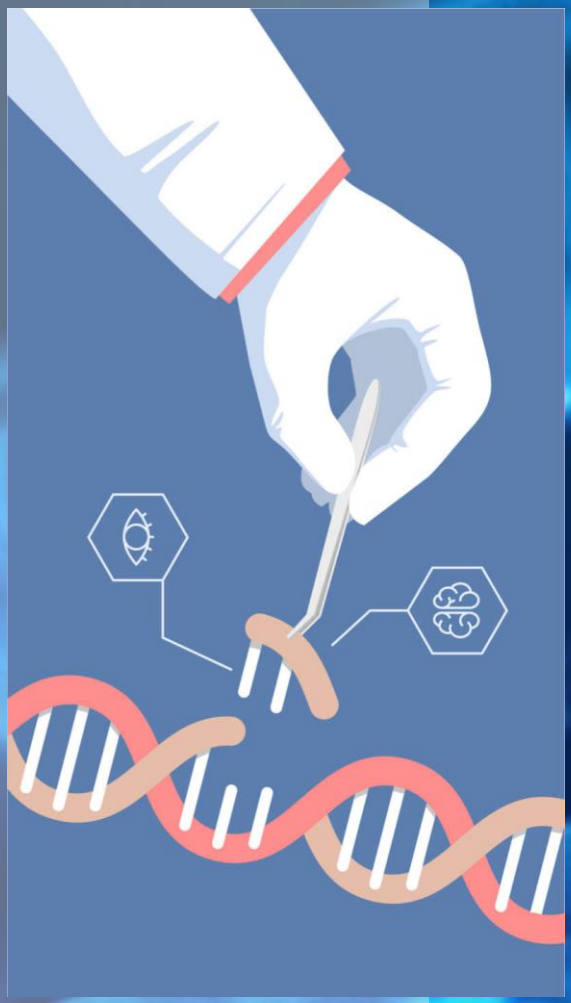
Biodiversity loss is at an all-time high, increasing the need for simple and rapid species monitoring systems. Atlantic salmon (*Salmo salar*) is an important species in our waters. In the Atlantic Ocean, large vessels have historically dedicated themselves to fishing this species in large quantities. While migrating to their spawning grounds, fishermen use traps and other structures to catch them. Unfortunately, overfishing, climate change and competition among non-native species endanger the survival of Atlantic salmon, leading to the near extinction of several of its subpopulations.

Traditional methods for monitoring Atlantic salmon require visual detection and counting. These techniques are expensive, time consuming and can lead to harm of the target species. Environmental DNA offers a solution to this, through non-invasive species detection.



WHAT IS eDNA?

Environmental DNA is DNA obtained directly from an environmental sample, instead of from the creature or organism the DNA itself is from. eDNA could be collected from a soil or water sample. Presence of the eDNA from a species of an organism in the sample indicate its presence in the environment.



WHAT DOES THE PROJECT ENCOMPASS?

This interdisciplinary project aims to tackle challenges with monitoring specific species in freshwater environments, particularly targeting the Atlantic salmon, but is applicable to any species of interest.

Conventional methods for eDNA detection use quantitative PCR methodology, which poses difficulties with adaptation to a biosensor device due to the high temperatures and thermocycling required.

We have therefore developed an isothermal method of amplification and detection, utilising CRISPR-Cas technology, more commonly known for its role in genome editing. This not only simplifies the challenge of developing a biosensor device but also increases the ability to detect sympatric taxa using molecular techniques.

HOW IS THE RESEARCH FUNDED

This research is funded by Irish Marine Institute as part of the Burrishoole Ecosystem Observatory Network 2020: BEYOND 2020 PBA/FS/16/02

Foras na Mara
Marine Institute

PUBLICATIONS

The application of CRISPR-Cas for single species identification from environmental DNA

Molecular Ecology Resources / Volume 19, Issue 5; doi.org/10.1111/1755-0998.13045

SUSTAINABLE DEVELOPMENT GOALS

DCU Water Institute
dcuwater
E: waterinstitute@dcu.ie
www.dcuwater.ie