



NUI Galway  
OÉ Gaillimh

# MOREFISH



Connect & Discover

FitzGerald Richard<sup>(1,3)</sup>, Cooney Ronan<sup>(1,3)\*</sup>, Tahar Alexandre<sup>(2)</sup>, Kennedy Alan<sup>(1,3)</sup>, Behan Conor<sup>(1,3)</sup>, Naughton Sarah<sup>(2)</sup>, Kavanagh Siobhan<sup>(2)</sup>, Fogarty Andrew<sup>(2)</sup>, Rowan Neil<sup>(2-3)</sup>, Clifford Eoghan<sup>(1,3)</sup>.

<sup>(1)</sup> College of Engineering and Informatics, NUI, Galway, <sup>(2)</sup> Athlone Institute of Technology, <sup>(3)</sup> Ryan Institute, NUI, Galway,  
\* Corresponding e-mail address: ro-

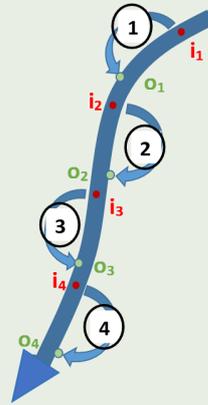
## What do we want? MOREFISH!!

MOREFISH is a multidisciplinary aquaculture project that develops and tests new innovative technologies and novel processes to significantly improve production management and efficiencies at inland aquaculture sites. It is a joint collaboration between NUI, Galway and Athlone Institute of Technology, funded by the Department of Agriculture Food and the Marine. Key areas of the project are to (i) enhance production efficiency and sustainability, (ii) reduce environmental impacts from production and (iii) improve fish health and reduce diseases/mortalities in rearing systems due to improved operating conditions.

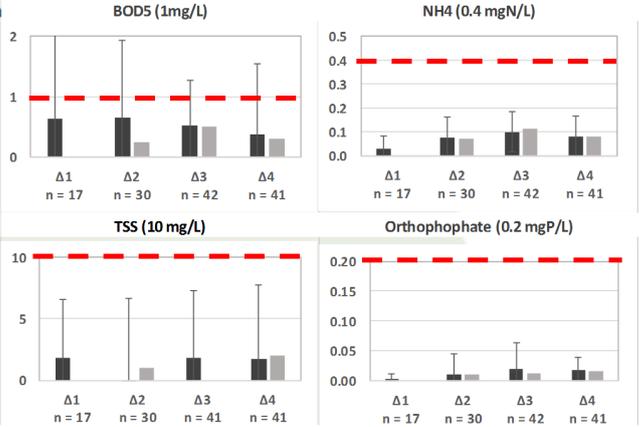
To date the MOREFISH project has conducted various on-site trials at freshwater aquaculture sites and has tested at laboratory and site scale a number of novel aeration and disinfection technologies. Some of the outcomes include: **1)** Limited impact on receiving waters from sites based on historical data and an intensive on-site monitoring programme (Figure 1). **2)** A high level of variance was found in the conditions and parameters of the discharge and operational licenses applied to aquaculture sites. **3)** Substantial opportunities to further improve the efficiency of the industry in terms of energy consumption and process control have been identified (Picture 1). **4)** Excellent collaboration with industry and other stakeholders in the aquaculture sector that can lead to new research avenues that directly impact the future of the sector (Figure 2).

The Irish freshwater aquaculture sector (Figure 3) has significant potential for expansion under Foodharvest 2020, and with the publication of the National Strategic Plan for Sustainable Aquaculture Development the outcomes of the MOREFISH project could not be more timely.

The MOREFISH project is funded by the Department of Agriculture, Food and the Marine (14/SF/872).



## Compliance with discharge licence?



Each sub farm in compliance with the Co.Co. discharge licence

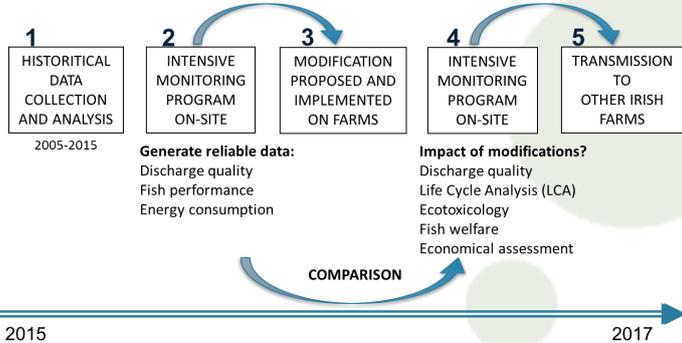
**Figure 1:** Data gathered by discharge licensing authorities was reviewed for the period 2005-2015. The red dashed line in each graph represents the 95th percentile. Each farm in this site was in compliance with discharge limits.



**Picture 1:** An example of some of the microbubble technologies being used by MOREFISH. This unit produces microbubble in the 50-500µm range through mechanical shearing.

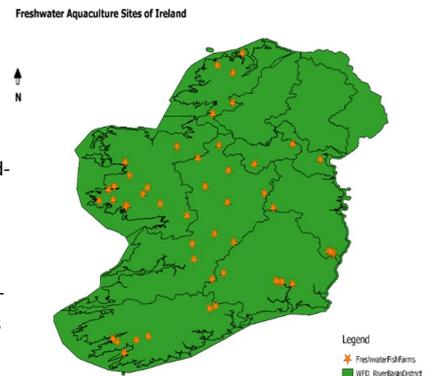
## The MOREFISH approach

### Five steps general approach



**Figure 2:** The approach used by MOREFISH to analyse the independent data held by the issuing authorities and determine the level of compliance with discharge license. A comprehensive onsite monitoring campaign is conducted and determinations are made on modifications and improvements in process efficiency. Changes implemented are assessed and trialled on other sites.

**Figure 3:** Of the 61 freshwater aquaculture licenses issued, 23 of these units are in operation. These sites abstract from lentic and lotic sources and discharge to waterbodies of varying status. The most common parameters imposed on farms are BOD, pH, suspended solids, orthophosphate and ammonia. Some of the values that farms must comply with are below the limit of quantification.



The MOREFISH team would like to express their immense sorrow at the passing of their friend, colleague and mentor Dr. Richard FitzGerald, without whom this project would not exist. He will be greatly missed.