

## Enhancing productivity and sustainability in Irish freshwater aquaculture (2015-2017)

### Irish freshwater aquaculture context

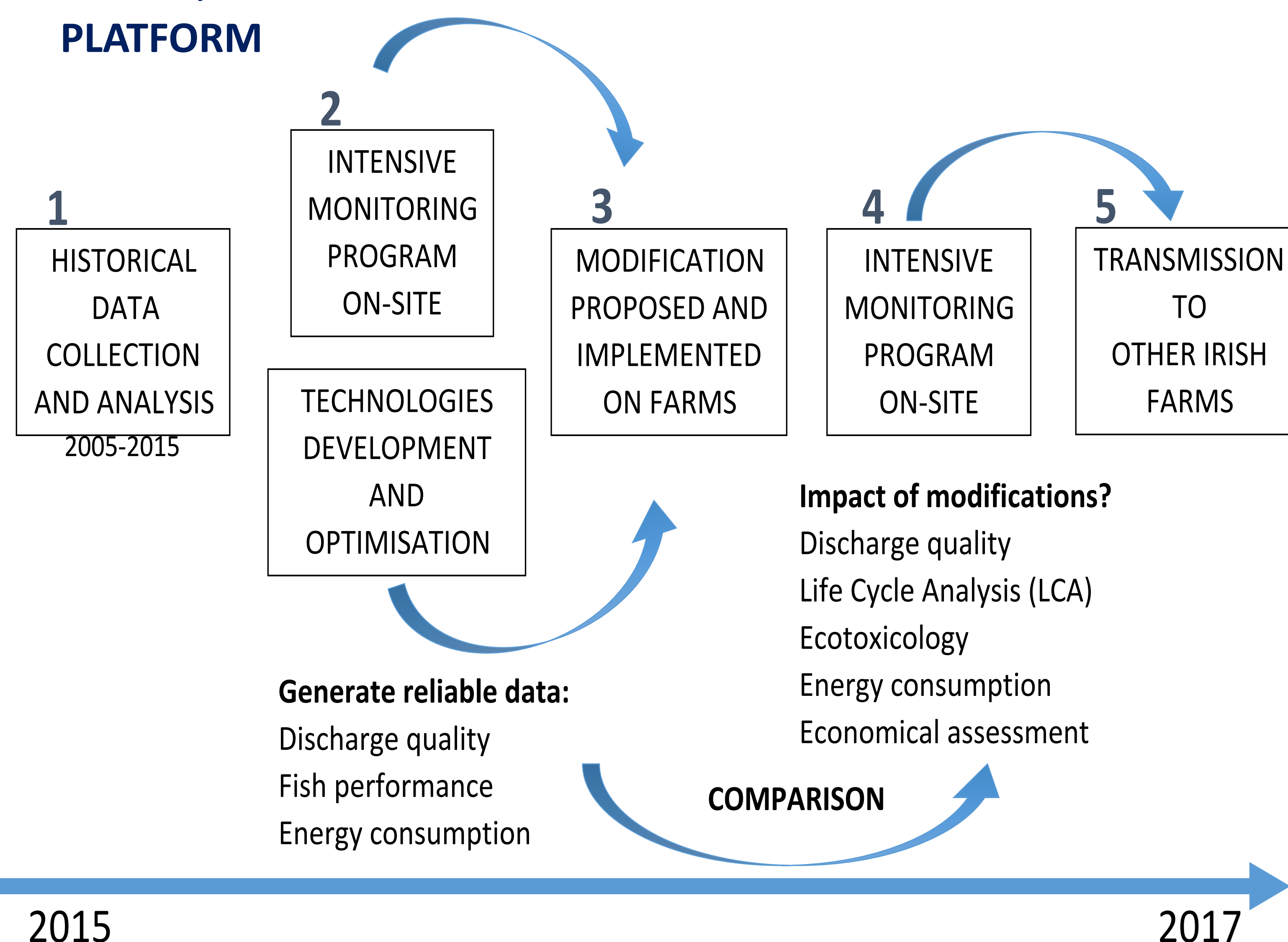
MOREFISH, a Dept. of Agriculture, Food and the Marine (DAFM) funded project, was a collaborative program between NUI Galway, Athlone Institute of Technology (AIT) and industry stakeholders (i.e. fish farms and industry/state bodies). The legislative framework concerning inland aquaculture is evolving via the water framework directive (WFD) through increasingly stringent discharge limits (e.g. ammonium, phosphorus) and existing or potential limitations on freshwater abstraction rates. Irish freshwater aquaculture mostly produce salmonid species such as rainbow trout and salmon smolt in traditional flow through systems involving high water abstraction volumes, with no or limited water reuse in place. Therefore, this industry has a need to reduce costs and enhance productivity in a sustainable way as recommended by both Irish government (e.g. Harvest 2020 program <sup>[1]</sup>) and European Union policy<sup>[2]</sup>. Developing reuse or partial recirculation involving oxygenation and water treatment appears to be a potential solution to improve Irish aquaculture practices and to increase production in a sustainable way <sup>[3]</sup>.

### Objectives

- PROPOSE SOLUTIONS TO IMPROVE BOTH IRISH AQUACULTURE PRODUCTIVITY AND SUSTAINABILITY
- TECHNOLOGIES DEVELOPMENT AND OPTIMIZATION IN RELATION TO ISSUES ENCOUNTERED IN THE INDUSTRY (AERATION/OXYGENATION, DISINFECTION)

### Approach

- MULTIDISCIPLINARY APPROACH (ENGINEERING, WATER TREATMENT, FISH BIOLOGY, MICROBIOLOGY, TOXICOLOGY)
- CHOICE OF INDUSTRY STAKEHOLDERS REPRESENTATIVE OF THE WHOLE FRESHWATER INDUSTRY
- CONTINUOUS LINK WITH THE INDUSTRY, REGULATORY BODIES, EU RESEARCH INSTITUTES → CREATION OF A PLATFORM



### Main outputs

- **INDUSTRY BENCHMARKED**
  - General compliance with discharge license limits (e.g. ammonium, BOD<sub>5</sub>, phosphorus)
  - Limited impact on receiving water quality
  - Some fish farms at their maximum capacity (water treatment and reuse needed to produce more without damages for the environment)
- **TECHNOLOGY DEVELOPED**
  - Aeration/oxygenation innovative methods tested and deemed potentially efficient at farm scale
  - Pulsed UV effective for removal of aquaculture relevant pathogens
- **INDUSTRY ENGAGEMENT ACHIEVED**
  - Platform developed between all the stakeholders to facilitate the future evolution of practices and regulation framework
  - Link established with leading EU institutions in aquaculture

### Main recommendations

- Further development of technologies (aeration/oxygenation, water treatment) to maximize water reuse opportunities
- Strengthen MOREFISH platform/regulatory body engagement to successfully meet the WFD challenges
- Pilot scale program to trial/validate model trout farm approach (decoupling of production volumes from discharge/development of appropriate technologies for water treatment/reuse)

### Conclusion – take home message

- MOREFISH project undertook a multi-disciplinary approach (i.e. engineering, toxicology, water treatment, management).
- Long term study on real-sites representative of the Irish freshwater aquaculture
  - Limited impact on receiving waters but to increase production, the industry will have to incorporate water treatment / water reuse in order not to impact water quality (WFD)
  - Technology developed and ready to be tested on-sites (aeration/oxygenation, disinfection)
- MOREFISH platform established to address industry challenges (WFD, sustainability, growth)

*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 have existed. He is greatly missed.*

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#### References:

- <sup>[1]</sup> DAFM (Department for Agriculture, Food and the Marine), National strategic plan for sustainable aquaculture development (2015)  
<sup>[2]</sup> EU – COM Strategic guidelines for the sustainable development of EU aquaculture, 229 pp. (2013)  
<sup>[3]</sup> Warrer-Hansen Ivar, Potential for Land Based Salmon Grow-out in Recirculating Aquaculture Systems (RAS) in Ireland, A report to The Irish Salmon Growers' Association, IFA aquaculture (2015)

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