

## Marine Challenge

### Project Outline:

The project has three distinct work packages: closed cage system, freshwater, and phytoplankton.

A closed cage system has been deployed and refined for the on growing of salmon at sea for the first six months. The system has been fitted with sterilisation and water filtration equipment installed to prevent contamination with AGD and sea lice along with a waste removal system. The entire system will be powered by a renewable hybrid energy system, incorporating wind and photovoltaic inputs, mitigating carbon inputs to salmon production.

The cage trial will take place in conjunction with the Marine Institute at the Lehenagh Pool marine testing site. The system has been refined in 2019 and 2020 and is now ready to complete a full deployment with a testing period of 4 months at sea. The full deployment in 2021 will represent the first time such a system has been used under Irish conditions This prototype will be thoroughly tested to see if the concept is technically and economically feasible. It will also be the first conventional closed containment system of this type.

The freshwater work package will establish if a freshwater lens contained within an existing salmon pen can effectively remediate against AGD. BIM will seek to establish a detailed analysis of gill health over the trial period and whether or not this continuing access to freshwater has a significant impact on AGD gill scores. BIM also plans to tag individual salmon within the system to ensure that all fish are 'choosing' to avail of the available freshwater. Complete records of feeding rates, food conversion ratios and the impact on sea lice occurrence will also be documented.

The phytoplankton work package will involve the deployment of multiple real time data logging sensors along with automated sampling systems. When thresholds in water quality are exceeded, we can initiate an automatic sample to be retrieved. This will enable BIM to analyse the composition and abundance of possible causative organisms. In tandem BIM will also develop and refine site specific remediation systems, this will involve the use of a physical and non-physical barriers such as bubbles and upwelling systems.

### Project Objectives:

- To test the efficacy of a flexible closed bag for closed containment growing
- To run a closed containment system at sea using sea pen infrastructure
- To improve survival and growth rate in the first 6 months post smolt transfer
- To minimise energy usage of a closed containment system
- To maximise the efficacy of biological treatment methods
- To support fish welfare
- To reduce the costs associated with current freshwater treatments, in relation to boats, generators and staff
- To reduce the impacts on fish health by reducing the number of times fish are moved by pump
- To reduce the impacts of AGD by enabling fish to 'self-treat' by the use freshwater that is always available
- To investigate the effects of this lens of sea lice abundance on Atlantic salmon
- To transfer this technology to a commercial site for testing
- To develop a network of water quality sensors in order to assist with the early detection of harmful organisms.
- Increase knowledge of water quality around the coast particularly in relation to aquaculture sites

- To develop and deploy a physical barrier system
- To test bubble curtains particularly in relation to commercial effectiveness and running cost

**Expected Benefits:**

A more controlled environment for the transfer of salmon smolts from freshwater. Enhanced monitoring programs will be developed for onsite deployment enabling site managers maximise site productivity. Decreased costs of production in Salmon aquaculture, improved fish welfare and improved health and safety.

**Projected Cost: €325,000**