BUSINESS 2SEA | FÓRUM DO MAR

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Oyster Farm Environmental Condition Monitoring in Lough Foyle

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WiSAR Lab

"Expanding the Wireless World"

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Background to Pilot Project

- Populations of the European flat oyster (Native Oyster) *Ostrea edulis* have declined dramatically across much of the species geographical distribution since the mid-1900s - as a result of historic over fishing
- The native oyster was identified in the "Biodiversity: the UK Action Plan" in 1994 and in 1996 Action Plan as a "priority species" and given an individual species action plan known as the "Native Oyster Species Action Plan" as part of a national commitment to the International Convention on Biodiversity (UKBAP 1999).
- **Lough Foyle** in the north of Ireland has been an important socio- economic resource for hundreds of years, supporting lucrative fisheries, predominately for oysters, mussels and salmon. Historical records show that *O. edulis* has been harvested from Lough Foyle since pre 18th Century. The fishery has always been self-propagating and therefore reliant on spat production and fall onto natural oyster beds.
- The overall population size and the area occupied by the native oyster in Lough Foyle had declined due to historic overfishing.
- The decrease in overall adult biomass means there have been very poor spat fall events over the last number of years. Thus, recruitment into the population has been low.

Loughs Agency Plan for Sustainable Native Oyster in Lough Foyle

- The Loughs Agency an all-Ireland body has regulated the Lough Foyle Native Oyster Fishery since September 2008, and the impact of this is evidenced in the cohort structure of the oyster population in the more recent surveys.
- Loughs Agency is running a project to improve the Lough Foyle native oyster population size, and increase and sustain the area of suitable habitat: "*Habitat Enhancement and Broodstock Management as a Tool to Aid Native Oyster Bed Restoration*".
- The "Oyster Tank Remote Monitoring System Pilot" will be used in the "spatting ponds" element of the project
- The aim is to produce juvenile oysters from Lough Foyle adult broodstock, in a protected in vitro environment and stock them into Lough Foyle in order to augment the population.
- The spatting ponds will allow adult oyster broodstock (from Lough Foyle) to be suspended in the water column in purpose-built ponds
- The "Oyster Tank Remote Monitoring System Pilot" is a means to remotely record environmental conditions in the spatting ponds at regular intervals without the need for personnel on site.

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Project Requirements

Oyster breeding can depend on many environmental factors such as temperature, tide strength, dissolved oxygen content etc. The tanks will provide the oysters with controlled, ideal breeding conditions. Due to remotemess tanks will be monitored remotely by an autonomous system which transmits the data over a long range wireless system to a cloud based database which stores the data to be viewed/displayed on an online dashboard either live or at a later date.

Environmental Sensors for Tank Water

- Temperature, PH, Conductivity, Optical Dissolved Oxygen, Turbidity, Chlorophyll

Communications Module

- The communications module shall communicate the sensor data back to a designated web server via a suitable long range wireless protocol at regular intervals to be programmable by the Loughs Agency

Autonomous Operation

- The system shall be capable of operating remotely and autonomously for extended periods. Powered by rechargeable battery charged with renewable energy .

Web Server

- The web server shall present a public facing API to receive data from the communications module.
- Data shall be parsed into a database.
- A web page will be available for users to view the live data.
- Alerts will be communicated if any of the environmental data has crossed a defined threshold

Procurement

- After a review of the specification and the current state of the art, it was decided to procure an off the shelf solution.
- This allowed for ease of implementation of the system into its environment and provide for a reliable result to the pilot
- The successful supplier to fit the technical brief was the Manta M+35 from RSHydro

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Implementation and Testing

- Commissioned at Loughs Agency offices in Derry, for testing.
- Some problems with incorrect specification on solar panel were resolved
- Access to live results from sensors remotely available through online dashboard

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Remote access to live results

Link to Dashboard - Live Water Monitoring Data

Loughs Agency are currently testing and will be implementing in the field when their new oyster spatting tanks are installed

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