

EMFF Operational Programme 2014-2020 Seafood Processing Development Measure

BIM Seafood Technical Services

Knowledge Gateway Scheme Work Programme Projects

Final Report 2020

BENEFICIARY: BORD IASCAIGH MHARA
PROJECT REFERENCE NUMBER: 20/KGS/STS008.1
NAME OF PROJECT: Seaweed Development
IMPLEMENTATION PERIOD: 1st January to 31st December 2020

Project Scope

2020 was the final year in the contract awarded in 2018 to Cartron Point Shellfish to support the Seaweed Development Programme. This project largely involves the production of 10kms seeded collector string (*Alaria esculenta*), and the refinement of culture techniques and supply of another species of brown seaweed *Saccharina latissima*, however to date there has been little demand from industry for this species (this may change 2021). Seeded collector string is made available to licensed sea site operators on a first come first served basis. The project also included investigative work on the handling and culturing of the more valuable red weeds, *Palmaria palmata* and *Porphyra umbilicalis* in the hatchery and in grow-out tanks. *Porphyra* is particularly difficult to manipulate having a complex lifecycle and we have taken an innovative path in field surveying for asexual plants with the intention of neutral spore release onto nets as an easier route, advice on this was sought from international experts.

Objectives

Specific programme objectives were applied in 2020 as follows;

- Produce 10kms *Alaria* seeded collector string 2020 for trial sea deployment at licensed sites
- Make culture available for spraying on string by industry (up to 40kms)
- Assuming good growth conditions production at sea may reach 300T fresh weight brown seaweed
- Field survey for *Porphyra umbilicalis* – limited to sites local to BMRS
- Continued work on early innovation spore release and settlement of *Porphyra* Sp to grow-out
- Continuation of early innovation tank based *Palmaria palmata* culture

Budget: €205,788

Achievements/Spend

This project met all 2020 targets in terms of seeded collector string and culture deliverables and the required work on *Porphyra* and *Palmaria*.

Multiple sporulations of *Alaria esculenta* were carried out at BMRS in 2020. The decreasing availability of ripe sporophylls was observed at all sites where they had been previously abundant. This phenomenon was observed in 2019 and there is a general agreement amongst phycologists that climate change is having a significant effect on the distribution of *Alaria*. In 2020 sporophylls from the BMRS farm in Bantry Bay helped supplement the wild collection.

Multiple sporulations were conducted from February to April 2020. At peak production there was 190 litres of gametophyte culture in the cold room. Given the density of these cultures, this was sufficient for at least 100 kms of seeded string. Requests for seeded string were confirmed by May 2020 but as the year progressed many seaweed farmers reviewed requests downwards. Original requests for almost 20,000 metres were reduced to 13,000m by October 2020. A total of 13kms metres of seeded string was produced. The first batch was ready to go to sea by mid- October. The second batch was ready at the end of November.

To compare the suitability of the seaweed string being used a comparative string experiment was conducted in July 2020. Three string types were selected:

- A Kuralon polyamide string traditionally used and obtained from Asia.
- A cheap readily available Dutch polyester string
- A Gortex experimental material being trialled by Gore Ltd. USA

The Kuralon collectors were best for absorbing the culture. The Gortex material appeared to almost repel the culture. The Dutch string absorbed some culture but not as well as the Kuralon.

A second experiment was devised to try and ascertain the optimal plant density of *Alaria* on Kuralon collectors. Three batches of six collectors were separated with different density of culture media (100%, 25% and 12.5%. The collectors were deployed at three sites: Bantry Bay, Galway Bay and Bere Island. Sampling will begin February 2021 on these lines, and it is hoped that optimal spraying density will be established from the data collected.

***Palmaria palmata* trials**

Small plants of *Palmaria palmata* were collected on the mid to upper shore at Gearhies in January 2020, and November 2020. These plants were carefully cleaned using sterile seawater. The plants were cultivated indoors in sterile seawater at 10 -12 °c, 12-hour photoperiod, 35µ mol⁻¹ and F2 medium. This indoor biomass was maintained as a backup supply to the outdoor production unit.

Four main challenges for work in 2020 were identified:

- Bleaching of plants
- Grazer activity
- Tetraspore release
- Epiphyte fouling

Problems with epiphytes, bleaching, tetraspore release and grazers were encountered in March and April. An experiment to investigate the impact of light control and nutrient addition on biomass production in the algal system was set up. Bins were thoroughly cleaned, and nutrients were added daily to one black and one white bin. The water flow was stopped for approximately 6 hours post the nutrient addition. A third bin had a 24-hour water flow but no nutrient additions. The bins were cleaned at fortnightly intervals and biomass recorded. Observations on the blade colour and presence of epiphytes were also noted.

The best results were obtained from the white bin with nutrient addition. Biomass increased almost tenfold in one month. The seaweed with no nutrient addition was very bleached after four weeks and had to be removed. These tanks were maintained for 14 weeks in total without any introduction of fresh seaweed from indoors.

Growth over the 14 weeks slowly started to decline and the presence of grazers at a low level was detected at the beginning of July. As the water temperatures increased during the summer months all but one of the white tanks were replaced with black tanks and all tanks received daily nutrient additions and temporary water flow- through. Whilst white tanks with nutrients generally resulted in greater yields the blades showed more epiphyte cover. Blade quality was much cleaner in black bins.

These results from a summer period were a major improvement on previous years. The problems with bleaching and epiphyte cover were overcome by using black tanks and nutrient additions. Whilst grazer control was not so clear-cut the introduction of fresh seaweed from indoors was invaluable during large grazer outbreaks.

***Porphyra umbilicalis* culture collection and broodstock**

Porphyra broodstock taken from the wild in west Cork was infected with numerous epiphytes which grew fast in culture conditions. It was hoped to get new asexual material from successful sporulations or from new material collected on site in early 2020, however it proved impossible to get epiphyte free plants from sporulations and with travel restrictions it was not easy to locate new asexual plants from the wild. Therefore the 2020 culture collection consisted entirely of asexual *P. umbilicalis* from a site in Kerry.

Three sporulations using suitable plants were completed in the spring 2020. An extremely low density of spores was detected. After 10 days mustard brown spots were observed on the nets and frames. Epiphyte fouling were an ongoing problem however some *Porphyra* plants did survive on the Gortex material despite the presence of epiphytes.

It became apparent by late Spring that spore release and survival of plantlets was extremely low, in early May the largest and healthiest plants were selected for on growth. These flasks were examined and renewed weekly, and the stocking density was reduced gradually over the following months. Two sporulations were conducted using the largest plants in June 2020. Spore release was observed, but the nets quickly became covered in epiphytes and the asexual plants failed. A sporulation using material that had been frozen for three months was conducted in July 2020. Whilst spores were observed on discs none were seen on nets.

An intensive examination of all asexual *Porphyra* plants in the chill cabinets was done in late November. Poor quality blades were discarded, and densities reduced. No ripe material was observed. The conclusion drawn is that the stock in the hatchery may be of inferior genetic strain, it is stressed in culture and needs replenishment.

SUMMARY OF SPEND:

Total Approved	€205,788.00
Total Eligible Expenditure	€198,548.68
Total Drawdown	€198,548.68
EU – 50%	€99,274.34
Exchequer – 50%	€99,274.34

Report by: Lucy Watson

Date: 10th March 2021

BENEFICIARY: BORD IASCAIGH MHARA
PROJECT REFERENCE NUMBER: 20/KGS/STS008.2
NAME OF PROJECT: Identification, extraction and testing of anti-methanogenic compounds from Irish seaweeds.
IMPLEMENTATION PERIOD: 1st January to 31st December 2020

Project Scope

2020 was the final year in the contract awarded in 2018 to Bantry Marine Research Station for the BIM project, Identification, extraction and testing of anti-methanogenic compounds from Irish seaweeds. The project was carried out at the Bantry Marine Research Station facilities which is licensed for the weeds of interest and has the required hatchery and tankage for the contracted work. 2020 built on the lessons learned and the work carried out in 2018-2019. The scope of the work was to screen a variety of red, green, and brown locally present seaweeds for their active ingredients, specifically their bromoform potency using an amended method developed and described by Dr Rob Kinley, CSIRO. Bromoform is indicated in reducing methane production in ruminants while at the same time offering nutritional enhancement benefits from a natural raw material (seaweed). The product is directed at farmers who are under pressure to comply with government targets for green-house gas emissions.

Objectives

Specific programme objectives were applied in 2020 (building on work completed) as follows:

- Continued screening of native Irish species and assessment of anti-methanogenic potency
- Investigation/feasibility of cultivating the most potent species to develop biomass.
- Economic assessment of feasibility of undertaking

Budget: €75,152

Achievements/Spend

Higher levels of bromoform and bromine were found in samples of *Asparagopsis armata* when compared with other species of weeds collected and identified in the west Cork area. The presence of bromoform and bromine in samples were higher in Spring, suggesting that the daylength and the presence of herbivores may induce the production of the secondary metabolites that act as a defence against microbes.

The results suggest that *Asparagopsis armata* present in Irish coastal waters is a perfect candidate with a high potential that could be cultured when applying optimal conditions. Both stages of *A. armata* (gametophyte and tetrasporophyte) have demonstrated significantly higher concentrations (when compared to other species) of the active ingredient, bromoform, which has been shown to reduce methane production in cattle when fed at an inclusion of 2%.

The project established that a controlled and constant temperature and photoperiod, along with uncontaminated water are very important key factors to produce the species as the presence of epiphytes can heavily affect the seaweed cultures. Variables to be explored further include differing photoperiods, temperatures and type and quantity of nutrient solution used as well as identifying the ideal amount of biomass per litre of water in each flask. Interestingly both stages of *A. armata* have demonstrated significantly higher concentrations (when compared to other species) of the active ingredient, bromoform, which has been shown to reduce methane production in cattle.

There are reports on the farming of both the gametophyte phase and tetrasporophyte phase however it has been proven to be far easier to grow the tetrasporophyte phase onshore. Leonardo Mata of Centro de Ciências do Mar in Portugal has been trying to grow *Asparagopsis* since 2002, he was successful in growing

the tetrasporophyte phase in tanks of 100 L. However, it has taken him 15 years to start growing the gametophytes and as yet there no published protocols. A French cosmetics company Algues & Mer successfully farm the gametophytic phase of *A. armata* on 5 ha at sea. They own the patent for growing gametophytes, which gives details on how to grow it from cultures. They take cuttings every year in autumn from wild seaweeds to replenish the culture. Harvest happens between February and April.

The commercialisation of *A. armata* has the potential to meet an unmet need for the beef and dairy industries, i.e., a natural anti-methanogenic product that could substantially reduce the carbon footprint of the sector and help meet national GHG emission targets. It provides an opportunity for product differentiation, i.e., “low-emissions beef and dairy”, to meet the demands of consumers in Ireland’s key export markets.

Such a product may have substantial economic value which in turn can underpin the economic viability of a technology-driven macroalgae industry, using both onshore and potentially inshore cultivation techniques. Such a sector, with a product that can drive much needed scale and financial investment, will have significant growth potential, and support the emergence of viable enterprises in rural, coastal communities.

SUMMARY OF SPEND:

Total Approved	€75,152
Total Eligible Expenditure	€75,152
Total Drawdown	€75,152
EU – 50%	€37,576
Exchequer – 50%	€37,576

Report by: Lucy Watson

Date: 10th March 2021

BENEFICIARY: BORD IASCAIGH MHARA
PROJECT REFERENCE NUMBER: 20/KGS/STS-BG002-BR013.1
NAME OF PROJECT: The transfer of commercially relevant research to the Irish seafood sector
IMPLEMENTATION PERIOD: 1st January to 31st December 2020

Project Scope

2020 was the last year in the contract awarded in 2019 to Intrigo for 'The Transfer of commercially relevant research to the Irish Seafood Sector' project. The initial project concerned engagement with Irish aquaculture research performers to identify knowledge outputs of potential relevance to Irish aquaculture sectoral development, to support the improvement of the flow of expert and targeted research findings from research institutions carrying out aquaculture research (with initial focus on Ireland then moving to European) to Irish industry (finfish, shellfish, and seaweed). The work focused in on the areas pertinent to Irish aquaculture, diet, additives, genetics, health/survival, technology/systems, climate change, sustainability, economics, and regulation.

Objectives

The 2020 project work focused on the following key subjects:

- Identification of relevant aquaculture knowledge providers and outputs
- Assessing commercial opportunities arising from R&D
- Profile target users
- Develop a knowledge transfer plan
- Carry out knowledge transfer in conjunction with BIM
- Measure impact with BIM
- Identify and carry out two test cases for fisheries and processing projects
- Design, set up and maintain website www.IATiP.ie
- Provide secretariat support to IATiP (organising meetings, minutes, membership, assisting with membership database)
- Organising IATiP Conference Galway 7 and 8 April – Conference organisation completed but postponed due to Covid-19; outcomes transferable to conference now scheduled for April 2021.

Budget: €224,440

Achievements/Spend

Knowledge, commercial opportunities, target users, transfer plan

The project used a definition of a 'Knowledge Output', that was developed as part of the COLUMBUS project, to identify discrete units of transferable knowledge. 326 projects were reviewed and a total of 180 approaches were made, resulting in 126 interviews with individuals and Mirror Platforms deemed to have knowledge of potential relevance to the Irish aquaculture industry. As part of the innovative knowledge transfer process, evaluation of the collected knowledge by research, industry and policy experts is a critical step. Of the 148 Knowledge Outputs identified and described, 137 were pre-assessed and 56 progressed to an analysis meeting. Once the Knowledge Outputs were analysed, those that were deemed as medium and high potential were carried to an 'Internal Pathway Meeting' with BIM. The purpose of the meetings was to: Validate the Knowledge Output Pathways proposed by the experts; prioritise potential Knowledge Transfer activities; and agree next steps.

Impact

Three successive virtual Brokerage Events were organised and held on Friday 4th December 2020, welcoming over 100 attendees. These events were intended to highlight a range of promising technologies and innovations to the Irish aquaculture community. The event was divided into three sessions, covering seaweed, shellfish, and finfish. The recordings of these events are available on the IATiP website and YouTube. These recordings have been viewed 130 times since the event. As of 11th January 2021, 454 members are listed as part of the IATiP community, 411 of whom subscribe to receive the IATiP news updates. The community is active with regular engagement with the website and mail items that are sent via Mail Chimp.

Test cases

The additional Knowledge Collection test cases led to a further 39 approaches and 12 interviews, with 21 Knowledge Outputs described. A further five Knowledge Insights were also collected. The knowledge transfer work has reaped dividends and fed into efforts to access, understand, and relay aquaculture innovation ideas and technologies to our industry in Ireland.

Secretariate, website and Conference

The IATiP Mirror Innovation Platform has been established with a membership and Steering Committee. The platform is one of 15 in Europe, under the umbrella of the European Aquaculture Technology and Innovation Platform www.EATIP.ie and www.IATiP.ie. These platforms are designed to enable networking and communication concerning innovation in aquaculture across Europe for the benefit of aquaculture and all stakeholders (farmers, agencies, research providers, technologists). The platforms act as a conduit for communication from members into DG Mare and DG RTD in the European Commission.

Conference

The first Annual IATiP conference was planned for the 7th and 8th April 2020, in the Galmont hotel in Galway city. Over 40 speakers were confirmed, and registration was planned to open in mid-March 2020. However due to the Covid-19 pandemic and the ensuing public health guidance, it was decided to cancel the conference to ensure the safety of the IATiP members, speakers, and organisers.

Following the cancellation of the IATiP conference, discussions were initiated on how engagement and networking with the industry could otherwise be facilitated by the IATiP, in particular through the IATiP website. A draft plan for a portfolio of activities was developed. This included a series of interviews to stimulate knowledge sharing on innovation as well as the organisation of brokerage events and the publication of blogs through the website.

Recognising that the aquaculture industry was under severe pressure as a result of COVID with many farmers and companies having to adapt and adjust their ways of working, a series of online tools were created in 2020 to provide timely innovation information, knowledge and insights that could be of interest and value in the near future. Originally planned to take place over the summer of 2020, this work continued until the end of the December 2020 due to the positive response received from the industry. Both Irish and European research experts were targeted to inform and participate in the different resources, providing access to the latest technologies, innovations, knowledge, and ongoing research relevant to seaweed, shellfish and finfish farming in Ireland. Initially, the confirmed speakers from the cancelled IATiP conference were approached for interview. This soon expanded into approaching the owners of high potential knowledge identified through the analysis process.

Interviews were conducted as video calls that were edited and uploaded to the IATiP website and YouTube. The response from the community was very positive, with many requests for additional interviews and

updates on when the next set would be published. In addition to the videos, news items were created and shared which helped to raise further awareness of the resources.

Direct engagement with EATiP and Mirror Platforms

The project has supported the increased engagement of IATiP with both EATiP as well as the MiPs, including providing input into funding applications and position papers. For example, IATiP had a partner role in the development of a Horizon 2020 Innosup application in early 2020, which was unfortunately unsuccessful. Interaction with Mirror Platforms took place for different purposes. For example, as part of the knowledge collection exercise, dialogue was opened with Mirror Platforms who have similar aquaculture industries to Ireland, to identify knowledge and knowledge owners with potential solutions to common challenges.

SUMMARY OF SPEND:

Total Approved	€224,440.00
Total Eligible Expenditure	€224,025.95
Total Drawdown	€224,025.95
EU – 50%	€112,012.98
Exchequer – 50%	€112,012.98

Report by: Lucy Watson & Joanne Gaffney

Date: 10th March 2021

BENEFICIARY: BORD IASCAIGH MHARA
PROJECT REFERENCE NUMBER: 20/KGS/BG005-BR039.2
NAME OF PROJECT: Recirculating Aquaculture Multitrophic Pond Systems (RAMPS)
IMPLEMENTATION PERIOD: 1st January to 31st December 2020

Project Scope

Following on from exploratory work in the 2000's, BIM identified significant swathes of land in Ireland which could be utilised for aquaculture. In particular, marginalised rural land and cutaway peatlands form a significant land holding which offers little in the way of commercial return at present. Some 80,000 hectares of cutaway peatland alone will exit peat production in the coming years and whilst some can be rehabilitated, the opportunity for job creation in these areas remains limited. The RAMPS project developed out of preliminary work in perch pond production and is based on a modified design of similar systems used for catfish in North America. The RAMPS project began in 2018 and has quickly established the potential of these systems. Based at two licensed sites in Keywater, Co. Sligo and Mount Lucas, Co. Offaly, work has concentrated on system design and modification, system efficiency, algae and duckweed management, water quality, fish health and all the necessary components of a viable aquaculture system.

The freshwater sector in Ireland is facing challenges relating to regulatory pressures on effluent discharge and water abstraction. The aim of this programme is to develop robust new culture and treatment systems for the sustainable development of the sector. An ancillary benefit of such systems is that they have the potential to not only develop as circular economy projects but produce commercially viable protein which can be abstracted from the algae and duckweed.

The project seeks to get a better understanding of water quality of effluent and develop methods for remediating effluent. The project further seeks to explore the potential for developing multi trophic freshwater systems on marginalised agricultural land and cutaway peatlands. Using algae and duckweed to treat fish waste and recirculating water in pond systems thereby reducing discharges and abstraction. The majority of Irish freshwater farms producing salmon and trout have been based on river systems, abstracting water, utilising it and discharging back into the system, in many cases with minimal treatment.

The project has garnered significant national and international attention and has featured on television programmes such as the RTE six one news, Tabu (TG4), and Ear to the Ground (March 2020). In addition, scientists, and industry from at home and abroad have visited the project. Elements of the project are run in conjunction with UCC, NUIG, University of Bohemia (Czech Republic) and AIT providing significant academic and scientific back-up to ensure that key learnings drive further development.

Objectives

- Documented inputs and outputs on selected farms (2).
- Trial of technological and management-based solutions.
- Increased compliance with discharge consents.
- Utilisation of natural reedbed and wetland systems to treat effluent.
- Analysis of sludge generation and possible reduction solutions
- Develop a new freshwater production system for Ireland.
- Assess the potential for duckweed cultivation as a protein source.
- Create a circular economy test model.
- Assess the growth of perch and trout in such systems.
- Map the energy efficiency and Life cycle assessment (LCA) of the system.

- Production of out of season juveniles
- Expansion of Irish freshwater production
- Utilisation of non-agricultural lands
- Supply of niche organic product
- Perch & trout culture expanded.
- Farms open to external visits from stakeholders to encourage dissemination.
- Development of sustainable IMTA system delivering both fish and plant products.
- Continued development of brood stock programme

Budget: €274,000

Achievements/Spend

The RAMPS system is now operational at two sites in Ireland, Keywater Fisheries Ltd in Co. Sligo, and Mount Lucas Fish Farm in Co. Offaly. Domesticated and vaccinated perch from Keywater have been transferred to the Mount Lucas facility and key parameters tracked including growth & survival. In tandem Rainbow trout have also been stocked in the Mount Lucas Current obstacles to full commercialization of these systems include algal and cyanobacteria control and work in 2020 focused on establishing more stable duckweed production through the addition of wind breaks which have proven very effective. Full duckweed coverage was achieved in the summer of 2020 with minimal abstraction and discharge. Furthermore, ammonia levels on site have remained consistently low and, on many occasions, lower than the surrounding peatland. Covid restrictions affected the operation of some works and trials on both sites in 2020 including planned harvesting, transportation and spawning but generally the farms continued to operate as normal. Increased cyanobacteria levels in March 2020 at Mount Lucas were likely caused by significant rainfall, otherwise algal levels remained constant. Significant bird predation occurred on site in the latter half of 2020 and mitigation measures were put in place.

Milestones achieved in 2020;

- Harvesting of Rainbow Trout
- Duckweed cultivated and dried and sent for salmon feed trials.
- Perch produced out of season and stocked in systems.
- Aeromonas vaccine type 2 tested.
- Duckweed wind break system deployed and tested
- Mesocosm production of perch juveniles trialed and tested.
- Trial of organic egg production
- F9 broodstock developed and successfully spawned.
- New nursery screens trialed
- Maximum planned biomass reached in 3 of 4 ponds in Mount Lucas without water quality issues
- Significant increase in site biodiversity at Mount Lucas

SUMMARY OF SPEND:

Total Approved	€274,000.00
Total Eligible Expenditure	€269,760.19
Total Drawdown	€269,760.19
EU – 50%	€134,880.10
Exchequer – 50%	€134,880.10

Report by: Damien Toner

Date: 10th March 2021

BENEFICIARY: BORD IASCAIGH MHARA
PROJECT REFERENCE NUMBER: 20/KGS/STS-BG005-BR009.1
NAME OF PROJECT: Optimisation of Native oyster substrate settlement methods and nursery rearing techniques
IMPLEMENTATION PERIOD: 1st January to 31st December 2020

Project Scope

Due to declines in native oyster populations and restrictions of harvesting of native oysters in environmentally compromised historical areas there is an increased need to develop alternative native oyster cultivation sites. Experimental work was carried out in 2019 to settle native oysters in extensive conditions using different substrates. The resulting spat were deployed at the end of 2019 to experimental nursery sites with a view to determining whether or not nursery culture is a viable strategy in boosting native oyster populations in a managed fishery. Growth and survival were monitored throughout 2020 in the different nursery sites in the different systems.

Objectives

For 2020 the objective was to monitor and assess the differing environmental pressures on these sites and modify on growing techniques to give the juvenile oysters the best possible conditions to develop and decrease potential mortalities. Spat produced in 2019 was on grown in different nursery sites until large enough to be relayed. Growth and survival were monitored and assessed.

Traditional spat collection techniques were also undertaken in selected areas using both mussel and oyster cultch to determine their relative effectiveness as settlement substrates in the marine environment.

Budget: €20,000

Achievements/Spend

Three inter-tidal nursery sites and two different nursery systems were stocked with settled spat from the 2019 spatting pond work. These sites were in Clew Bay (Roslaher) and Galway Bay (Mweeloon Bay and 2 areas of Aughinish Bay). Survival rates were disappointing in each site. Weather patterns throughout winter 2019/20 were characterized by high winds and heavy rainfall and this very likely contributed to mortality. The site selected at Mweeloon was easily accessible from the shore but when inspected many of the bags had been knocked off the trestles, so it was very likely that this site was too shallow and exposed.

Counts in Roslaher in July and again in September showed no mortality in spat over the summer. However, in the case of Aughinish when measurements were taken in November the reduction in mean size might suggest mortality in spat in the size range of 25mm – 45mm. In November 2020, the surviving spat was broadcast at three sites in Clew Bay and three sites in Galway Bay. Stocking density was roughly 10 spat per square metre.

The practicalities of getting the right set of tides along with the right weather conditions for transporting and deploying oyster bags was challenging, particularly when requiring third parties to take time out of their farming/fishing schedules at their busiest times. Considering the mortality levels, it may be necessary to leave the spatting cultch in ponds for a longer period. Historically settlements occurred in early July in the spatting ponds, however, in the last few years the main settlement has been in August. Thus, the spat coming out of the pond in October is smaller than it would have been in the past and this may be contributing to the winter mortality (I. Connellan pers comm.).

SUMMARY OF SPEND:

Total Approved	€20,000.00
Total Eligible Expenditure	€19,189.25
Total Drawdown	€19,189.25
EU – 50%	€9,594.63
Exchequer – 50%	€9,594.63

Report by: Patricia Daly

Date: 10th March 2021



BENEFICIARY: BORD IASCAIGH MHARA
PROJECT REFERENCE NUMBER: 20/KGS/STS-BG005-BR009.4
NAME OF PROJECT: Rope mussel degradable stocking and ropes
IMPLEMENTATION PERIOD: 1st January to 31st December 2020

Project Scope

Technology has moved on since the successful adoption of what is commonly referred to as the “New Zealand System” of farming rope mussels. The biodegradable cotton mesh which replaced plastic mesh stockings for supporting the attachment of mussels to grow ropes may now be replaced by a more environmentally benign product. The new mesh trialled in this project is made from plant-based derivatives which offer more flexibility in terms of possible mesh sizes and can be sourced within Europe, thereby reducing the shipping carbon footprint of mesh supply to the sector. There is also the possibility of using this yarn to produce other single use ropes in mussel farming such as the ties for attaching the grow rope to the headrope. One mussel farming company in Ireland, Blackshell Farm, who supplies biodegradable stockings to the Irish and Scottish rope mussel sector, has joined up with partners in Holland to work on this idea. Such initiatives offer sustainable solutions for improving the environmental credentials of the aquaculture sector and it is on this basis that support was given by way of funding a feasibility study during the early-stage development of the meshes.

Objectives

To support a trial of plant-based biopolymer meshes produced from manufacturing to deployment and to monitor its degradability at sea.

Budget: €10,000

Achievements/Spend

A comprehensive feasibility study was produced outlining the various stages of the project from acquiring a new machine more suited to the characteristics of this type of yarn to preliminary tests of the material in live mussel cultivation conditions in Clew Bay, on Blackshell Farm’s mussel growing site. The biopolymer mesh was found to work well with existing mussel farming machinery, and so could replace existing mesh types without any upgrades required. Blackshell Farm monitored the biodegradation stages of the yarn and these observations were sent back to the manufacturers in Holland to alter the yarn composition. This feedback loop resulted in five different yarn compositions to date, with testing still ongoing.

The report found that there may also be a potential benefit to the bottom mussel industry depending on rope grown seed for its stock source, where the biopolymer mesh could be used to create a biodegradable grow rope, which completely disintegrates.

SUMMARY OF SPEND:

Total Approved	€10,000.00
Total Eligible Expenditure	€10,000.00
Total Drawdown	€10,000.00
EU – 50%	€5,000.00
Exchequer – 50%	€5,000.00

Report by: Patricia Daly

Date: 10th March 2021

BENEFICIARY: BORD IASCAIGH MHARA
PROJECT REFERENCE NUMBER: 20/KGS/STS-BG005-BR009.5
NAME OF PROJECT: Oyster Industry Workshop
IMPLEMENTATION PERIOD: 1st January to 31st December 2020

Project Scope

BIM hosts technical industry focussed workshops on an annual basis to disseminate results of EMFF funded projects, update the industry on new regulations, discuss current issues and facilitate networking both within the sector and between the sector and the relevant Departments and agencies. The last oyster industry Workshop was in 2018.

Objectives

Information dissemination, networking opportunities.

Budget: €12,000

Achievements/Spend

The Workshop was held in Carlingford, Co. Louth and was a 2-day event from 13th February to 14th February with a full day of presentations and discussion on the 13th and site visits on the 14th.

Turnout for the Workshop was high with over 130 participants and 85% of Irish oyster businesses represented at the event. Day 1 featured presentations from a host of experts on practical topics of immediate interest to the Irish sector and the afternoon session concluded with a panel discussion, focussing on issues of major concern to producers including water quality management in Ireland and its impact on the sector.

Presentations with direct links to EMFF funding were:

- The business of oyster visitor centers
- Environmental improvements: oyster bag recycling, invasive species app, energy usage on farms and plastic waste
- Unified Marking Schemes
- BIM’s Food Safety Services
- EMFF Programme update
- Overview of Bord Bia’s Marketing Support Activities for the Irish Oyster Sector in 2019/2020
- EU Baseline survey on Norovirus: implications of possible EU limits & impact of post-harvest treatments on norovirus levels

The second day included site visits to both Carlingford Oysters and Cooley Oysters where producers discussed the pros and cons of different growing systems on the farm and were talked through one of our “best in class” depuration and packing facilities.

SUMMARY OF SPEND:

Total Approved	€12,000.00
Total Eligible Expenditure	€11,520.55
Total Drawdown	€11,520.55
EU – 50%	€5,760.28
Exchequer – 50%	€5,760.28

Report by: Patricia Daly

Date: 10th March 2021

BENEFICIARY: BORD IASCAIGH MHARA
PROJECT REFERENCE NUMBER: 20/KGS/STS-BG005-BR009.6
NAME OF PROJECT: Shellfish Optimisation Programme
IMPLEMENTATION PERIOD: 1st January to 31st December 2020

Project Scope

Following the review of the Benthic Mussel Sector by DAFM in 2019, BIM committed to modifications of the seed mussel survey methodology in 2020 including improved biomass estimation techniques and post fishery stock assessment. In addition, further works on potential brood stock biomass estimation, increased bivalve larval monitoring, genetics of stocks, seed survival and condition/spawning stage of both seed mussel stocks and mature stocks were included in the project scope.

The survey vessel the M.V. T. Burke II was used to locate and survey seed mussel beds on the East Coast, in Dingle Bay and other areas of Ireland. Post fishery stock assessment were carried out on the marked settlements. To better inform management measures and husbandry practices additional scientific work was undertaken to assess biomass stocks of mature mussels along with bivalve larval monitoring work). Mature and seed mussels were sampled from various locations to assess the condition and gonad indices and also the genetic distribution of mussels around the coast.

Objectives

The main objective of the benthic mussel program was to identify and quantify sustainable seed mussel beds around the coast of Ireland and facilitate the search for seed mussel beds for the industry. It also provides sound scientific information and data to DAFM to assist with resource management. It does so by producing survey reports that are made directly available to the industry and DAFM via the BIM website. Those reports detail the location of the seed mussel settlements, their estimated biomass, the nature of the seabed and the quality of the seed mussel. The survey information obtained is then used to determine if the beds are suitable for fishing.

The objective of the larvae monitoring was to give stakeholders a better understanding of the subtidal mussel life cycle. Both larvae and broodstock samples are collected on a weekly basis by industry members or local inshore fishers. The analysis provides details on larvae concentration and larvae age class for each sample.

The objective of determining the genetic distribution of the mussel around the coast of Ireland was to access the locations with mixed or pure *Mytilus Edulis* (Me) *Mytilus galloprovincialis* (Mg) and hybrid populations. Testing the community ratio of relayed longline seed mussel on bottom mussel sites over time should determine which species has a higher survivability rate. This will then allow Industry to select certain seed mussel sources which may have a higher rate of survivability in bottom mussel relay site.

Budget: €173,500

Achievements/Spend

The Covid-19 pandemic created significant logistical challenges for this project particularly as the vessel has a small highly skilled crew and there was little capacity to continue the survey effort if the skipper or the survey officer were required to isolate at any stage over the survey season. In recognition of this, management measures were introduced to restrict the exposure of crew to each other and the general public to prevent any incidents of Covid-19 on the vessel. Measures included:

- Hiring of self-catering accommodation for the survey officer and skipper for the duration of the 2020 season, delivery of the vessel to the east coast by the boat yard rather than requiring a crew to travel to the west coast on public transport to collect.

- Installation of screens and other mitigation measures onboard the vessel.
- Strict control on additional survey officers accessing the vessel.

These measures proved successful, and the project was delivered with only one minor interruption to survey (2-day cessation while a close-contact was awaiting test results).

Milestones achieved in 2020:

- Three seed mussel settlements were found: two on the east Wexford coast and one in Castlemaine Harbour, combined these represented 8,500 tonnes of seed mussel.
- Two half grown seed mussel settlements were also found: one outside Wexford Harbour and one south of Wicklow Head, however, these were not transplanted by the industry.
- Invasive Alien Species screening was supported on the seed beds, with samples collected and sent for analysis.
- The seed mussel fishery was therefore successfully opened in early September on the east coast and late September in Castlemaine Harbour.
- A post fishery survey was carried out on the two east coast settlements.
- 100 quantitative larvae samples were collected and analyzed during the monitoring period.
- 176 DNA larvae screening samples were also collected and analysed during this same period.
- 120 mussel samples for genetic screening were collected and analysed during this same period.

SUMMARY OF SPEND:

Total Approved	€173,500.00
Total Eligible Expenditure	€161,150.13
Total Drawdown	€161,150.13
EU – 50%	€80,575.07
Exchequer – 50%	€80,575.07

Report by: Nicolas Chopin

Date: 10th March 2021

BENEFICIARY: BORD IASCAIGH MHARA
PROJECT REFERENCE NUMBER: 20/KGS/STS-BG005-BR031.3
NAME OF PROJECT: Enhanced AGD treatments for the salmon farming industry
IMPLEMENTATION PERIOD: 1st January to 31st December 2020

Project Scope

Amoebic Gill Disease (AGD) is a recurring health issue for marine salmon farms. It is caused by a naturally occurring single celled planktonic organism and has no implications for human health or for interactions between farmed and wild fish. However, if left untreated in farmed conditions, high mortalities occur resulting in millions of Euros of losses. The preferred treatment method is bathing the affected salmon in fresh water for a period of hours.

This presents a challenge as transporting and obtaining the large volumes of fresh water needed to treat farmed salmon in sea pens for AGD at marine sites is problematic. Well-boats have been used to transport fresh water at an extremely high daily cost. Open tarpaulins have also been used to tow fresh water out to the cages, but this can only be done in very calm weather, otherwise overtopping sea water can contaminate the fresh water. In previous work programmes BIM has assisted in the development of a special bulk freshwater tow-bag that can carry the treatment water safely out to the sea pens.

It also takes considerable resources, financial, equipment and Human in order to successfully complete a desalination treatment using the current method, this is because large quantities of water need to be moved via well-boat and more recently via tow-bag. This also necessitates having a large pumping capacity onsite along with additional equipment such as dewatering stations. The current process also involves pumping the fish using specially modified pumps. It is accepted that this pumping creates additional stress for fish.

This project looks at an alternatives approach to freshwater treatments. A 'snorkel' was designed and commissioned; enabling us to observe the success of ongoing treatments. This entailed the commissioning of a small-scale desalination unit of approximately 50m³ day and using the output to create a so called 'freshwater lens' within the test cage. This concept exploits the fact that fresh water will 'float' on top of seawater in a discreet layer and not mix, if not disturbed by stirring agents such as wave action. It was hypothesised that the fish can then 'choose' to treat themselves by selectively occupying this layer until their gills have shed the amoeba.

Objectives

The project objectives were:

- To reduce the costs associated with current freshwater treatments, in relation to boats, generators and staff.
- To establish if these units can be assembled by the salmon farming sector.
- 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.

The project was coordinated and supervised by BIM staff both in head office and on-site. Various salmon companies will be involved in the trials with the initial unit being deployed on the MI owned trial site based at Lehenagh Pool. Veterinary services have been retained to facilitate health checks and to supervise animal welfare.

Budget: €96,000

Achievements/Spend

BIM deployed a flexible, strengthened, impermeable, bottomless structure within a salmon cage to test this approach. To that structure we added desalinated water that remained on the surface due the differences in density. We established how much freshwater must be added to the lens in order to keep the salinity below the critical level for AGD. We then intensively monitored the gill health benefits and whether or not this continuing access to freshwater has an impact on AGD gill scores. Individual salmon were also tagged within the system to establish if fish were 'choosing' to avail of the available freshwater.

We successfully built a reverse osmosis (RO) unit, using in country expertise, capable of supplying 50m³ of RO water per day. Salinity produced from this unit was less than 0.1 parts per thousand. We determined that high levels of prefiltration were required. This prefiltration should be below 20 microns. This would more easily permit 24 hour running of the desalination unit as reduced water flow feeding the main pump and membranes results in equipment shutdown. The prefiltration on reverse osmosis or nano filtration units should consider the suspended solids composition of the feed water.

The freshwater lens had an inflatable leading edge meaning that no additional solid flotation was required inside the pen. This eased deployment and recovery. The design of the tarpaulin included reinforcements along its depth to maintain its cylindrical shape. The pen used was 50m circumference having a diameter of 16m. Our freshwater lens tarpaulin had a diameter of 4m and a depth of 4m, the top 3 meters were considered to be part of the freshwater treatment system with the last metre of the structure considered to be the mixing zone.

We logged salinity at multiple depths, and we established that the salinity was stable while reverse osmosis water was being added to the lens. All results presented relate to logging at a depth of 3m where the most amount of mixing was considered to occur based on data logging experience.

Our results show that a salinity of less than 6ppt was achieved 35% of the time. With a salinity of less than 10ppt 73% of the time. Salinity increased to full oceanic conditions only when the RO Plant stopped working as the feed to the lens was directly from this unit. Trials in future years should employ the use of a storage facility with at least one day's freshwater storage capacity. This will enable the reverse osmosis unit to switch off but maintain flow to the lens strengthening the trial findings and results.

The fish were fed inside the freshwater lens encouraging them to move into this area. We saw this in the data as salinity increased from 3-5 ppt up to between 8 and 12ppt during feeding times. Salinity reduced once again when feeding ceased.

It took approximately one hour for full salinity to be regained once the reverse osmosis plant stopped producing water. When seeking to lower the salinity, it took approximately 2 hours to reach a salinity of 10ppt.

Radio Frequency tagging suggested that Salmon frequented the freshwater lens.

We measured gill scores and general fish health indicators when the trial commenced, midway through the trial and again at the end and compared with a control pen with no freshwater intervention.

Interpretation – Fish Health

Median Ct values in the snorkel cage show a significantly lower amoeba load compared to the control pen at the end of the trial. This observation is supported by lower AGD scores on histopathology at sampling point 3. AGD histology scores are not presented separately, but histology gill scores were largely driven by AGD like pathology and generally reflect the AGD severity on histology. Gross AGD gill scores do not reflect the lower amoeba load, but this scoring is based on the visible mucoid response and is not necessarily an accurate reflection of amoeba numbers or underlying pathology. This difference develops between sampling points 2 and 3, no significant benefit of the snorkel pen is apparent between sampling points 1 and 2.

Histology gill scores were significantly lower in the snorkel pen compared to the control pen, indicating a benefit of access to freshwater for gill health. Gill pathology scores were driven by *N. perurans* infection and waterborne irritation, most likely through gelatinous zooplankton. Skin scores were also lower in the snorkel pen, but the difference is minor and does not allow for statistically significant interpretation. Other OWIs examined did not show significant differences between the pens.

SUMMARY OF SPEND:

Total Approved	€96,000
Total Eligible Expenditure	€96,000
Total Drawdown	€96,000
EU – 50%	€48,000
Exchequer – 50%	€48,000

Report by: Geoffrey Robinson

Date: 10th March 2021

BENEFICIARY: BORD IASCAIGH MHARA
PROJECT REFERENCE NUMBER: 20/KGS/STS-BG005-BR031.4
NAME OF PROJECT: Marine Challenge Programme
IMPLEMENTATION PERIOD: 1st January to 31st December 2020

Project Scope

The initial six months after transferring salmon smolt to sea can be very problematic with the young salmon being stressed not only by the process of smoltification but also being challenged with AGD, Sea lice, phytoplankton, and other environmental health issues. It has been observed that once the fish in the sea have safely reached an average weight of one kilo or more that they are much more resistant to these risk factors. Thus, if the 'young' fish can be protected for the initial period after they are put to sea then the final outcome should be much improved.

In addition, we recognized that naturally occurring events in the marine environment could challenge fish greater than 1kg and we set out to establish what these variables were via the development and deployment of a real time sensors with data logging capability for later interpretation.

Objectives

This principal project objective was to establish if it is feasible to grow juvenile salmon in a closed containment system deployed from a conventional sea pen. Another objective was to progress the use of monitoring systems by the sector. Current real-time monitoring systems are very costly and require ongoing user maintenance in order to collect reliable marine data, these factors have resulted in sub optimal marine monitoring. When mortality events have occurred in the past, there is no information on which to base management strategies or future decision making, this is due to the transient nature of these issues.

The specific aims were:

- 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 validate and illustrate functionality of a real time data buoy including chlorophyll data.
- To support fish welfare

Budget: €124,000

Achievements/Spend

A closed tarpaulin was deployed in a conventional sea-pen for the on-growing of salmon at sea. The system was fitted with water sterilisation and filtration equipment to prevent contamination with AGD and other environmental challenges along with a waste removal system. The entire system was powered by a renewable hybrid energy system. The trial took place in conjunction with the Marine Institute at their Lehenagh Pool marine testing site.

We successfully deployed a 50m circumference flexible closed on-growing system from a conventional pen, we successfully collected waste produced within the system using a dual outlet system. The UV was suitably sized at 1,200w and provided a dose of over 100mj/cm. We used a three phase 1.8kw impeller pump with the water being pumped from a depth of 3m. The whole system was powered by a 24kwh renewable hybrid energy plant. This consists of 24kwh of battery capacity, combined with 3kw of renewable (wind and Photo Voltaic (PV). This system is supported by a 20kva generator which makes up any shortfall in renewable energy

supply. Energy usage per hour was less than 3kw with total energy use of 70kwh/day. We established through an in-depth monitoring solution that over a 2-week period we reduced generator running by 80% and saved in excess of 970 litres of gas oil and collected more than 150kw of renewable energy (accounting for 14% of total energy requirements). During this period, we reduced our Carbon output by a predicted 2500kg.

Once filled 2,000 fish were placed in the system to test the adequacy of the systems installed including the ability of the life support systems power management e.g., pumps and filters. Fish were fed ad libitum in the system to ensure that the waste removal system could deal with the loads required.

Two discrete data logging systems were trialled, and both performed as required. One system was deployed from a salmon cage and a second from its own buoy. The information gathered from these deployments proved invaluable to the sector in relation to unexpected mortality events which would otherwise have been missed by regular water monitoring and algal sampling. The real time sensor systems enabled meaningful management decisions to be made and highlighted gaps in sectoral knowledge that need to be closed. The information collected by these systems included Water temperature, salinity, Oxygen saturation/concentration, turbidity, suspended solids, Chlorophyll A, and phycoerythrin/blue green algae. We attempted to correlate the presence of high levels of Chlorophyll A with algal sample collection but had an insufficient number of samples in order to be able to derive meaningful results in respect of fish health and welfare. This was particularly the case when elevated levels occurred during the hours of 12 midnight to 4am and samples were unable to be collected.

There were advantages and disadvantages of both systems, the buoy mounted unit having a stand-alone power and communication system with no Wi-Fi or other external requirements for full functionality, it also did not require the use of any walkway space around the pen. This unit did require more purposeful sensor checks as boats would need to steam to the buoy for inspection whereas the cage mounted version was accessible during regular fish husbandry activities.

Suggested modifications to the system include the addition of an inflatable edge within the closed system in order to maximise the efficiency of the waste removal system. It is also felt that further enhancements can be made via the reduction of the inlet filter screen size from 60 micron to 10 microns, this will exclude most algae from the system but will reduce inlet flow from 20l/s to 8l/s. this reduction will result in increasing levels of Total Ammonia Nitrogen (TAN), and this a system biofilter will need to be installed.

SUMMARY OF SPEND:

Total Approved	€124,000
Total Eligible Expenditure	€124,000
Total Drawdown	€124,000
EU – 50%	€62,000
Exchequer – 50%	€62,000

Report by: Geoffrey Robinson

Date: 10th March 2021

BENEFICIARY: BORD IASCAIGH MHARA
PROJECT REFERENCE NUMBER: 20/KGS/STS-BG005-BR009.9
NAME OF PROJECT: Stress reduction measures for Pacific Oysters
IMPLEMENTATION PERIOD: 1st January to 31st December 2020

Project Scope

In the past number of years significant losses have been incurred in the intertidal growing of Pacific Oysters on certain sites around the Irish coast. It is likely that the causes of these mortalities were multifactorial and thus investigations are required and reduce or remove some of these environmental stressors in order to improve survival.

On observation has been that Pacific oysters appear to undergo increased mortality following certain environmental events such as elevated plankton biomass. This may cause rapid filter feeding and subsequent depletion of oxygen due to 'hyper-metabolic' activity and/or an increase in photosynthetic activity by the phytoplankton leading to lowered oxygen levels in the water.

This project aims to establish if the causative agent in oyster mortality is driven by phytoplankton biomass. BIM will monitor the quantity of phytoplankton, oxygen and temperature on the oyster site being tested and will validate these results using microscopy.

Objectives

The objectives are to test the efficacy of the screen and aeration system and to correlate elevated chlorophyll A levels or other anomalies water quality variables with Pacific oyster mortality. Due to the lag time between environmental stressor and subsequent measurably mortality a full season of monitoring is required with the aims as follows:

- To reduce mortalities associated with environmental events
- To manage water quality conditions on the aquaculture site
- To investigate the potential of renewable energy on a small scale on oyster sites
- An alarmed aeration system will be developed
- A Permeable barrier with rapid deployment and recovery capabilities will be tested
- Phytoplankton data inside and outside the screen can be compared

Budget: €30,000

Achievements/Spend

The objectives were to be achieved via the development of a screen that can act as a barrier allowing free movement of water but preventing ingress of harmful levels of phytoplankton, the screen permits some phytoplankton to enter in order to enable oysters to continue to feed and grow. A fully renewable powered automatic aeration system complete with real time sensor data was commissioned. This combined with microscopy validated samples was required to determine when the screen should be deployed. A stand-alone oxygen sensor was installed to detect when oxygen drops below a critical level and then the marine aeration system will start automatically.

We successfully developed a barrier with a mesh size of 25 micron that can be rapidly deployed around the perimeter of an oyster site for short periods, we estimate this to be between 4 and 10 days during the occurrence of potentially harmful planktonic events.

We also deployed a real time sensor system collecting environmental data including water temperature, salinity, turbidity, oxygen saturation/ concentration and Chlorophyll A. This was successfully deployed and collected data on an intertidal site with data uploads every 15 minutes. Furthermore, we created a marine aeration system that started automatically when oxygen reached a critical low threshold.

During the course of 2020 there were no incidences where phytoplankton abundance reached a critical level that required the intervention of a permeable barrier in order to reduce the biomass. As such we were unable to test the efficacy of the barrier under high biomass circumstances. Due to the lack of high phytoplankton biomass events in 2020 the alarmed automatic aeration system was not required and so we were unable to collect any data in relation to its ability to improve water quality conditions.

There is a plan in 2021 to deploy the system again if high biomass incidents are predicted or reported.

SUMMARY OF SPEND:

Total Approved	€30,000.00
Total Eligible Expenditure	€29,026.31
Total Drawdown	€29,026.31
EU – 50%	€14,513.16
Exchequer – 50%	€14,513.16

Report by: Geoffrey Robinson

Date: 10th March 2021

BENEFICIARY: BORD IASCAIGH MHARA
PROJECT REFERENCE NUMBER: 20/KGS/DIS002
NAME OF PROJECT: Industry Working Groups
IMPLEMENTATION PERIOD: 1st January to 31st December 2020

Project Scope

BIM has been actively encouraging more synergy between aquaculture producers by bringing them together to work on common themes that affect their businesses. This has proved extremely successful in the oyster growing sector. BIM has actively brought oyster producers who are packing and exporting Irish oysters together. All these producers have also been certified to the Bord Bia standard of Origin Green. This group of certified Origin Green oyster packing companies have been working as an industry group, Irish Oyster Packers Group, under the auspices of BIM for three years. The Group have found the forum an extremely positive endeavour and wish for it to continue. For BIM to continue to act as secretariat for the group and to assist in coordination with other State organisations such as Bord Bia, SFPA, FSAI and the Marine Institute. The group, through formal and informal meetings, exchange technical and trade information.

Lessons learned from the success of the Irish Oyster Industry Working Group will be directly transferable to other shellfish growing areas as many of the issues are similar. Logistics has always been a significant issue for live shellfish exporters due to the low volumes each producer can export at a single point in time. Coupled with this any delays and extra costs associated with Brexit can put these producers in a very difficult position. This project seeks to examine new technologies that have recently come to the forefront and examine how these could be integrated into the industry. One example of this is a new transport recirculation system that allow shellfish to be transported in chilled water in separate units within the one container. These units may allow shellfish to be transported in water and have the added benefit that they can be transported as a container by sea freight rather than only on the back of an articulated truck, a much lower carbon solution.

Objectives

Meeting of what is known as the Irish Oyster Packers Group companies to share information and knowledge transfer. The group is to meet up to four times per year.

To examine alternative strategies to reach the market using new technologies in logistics. This will allow producers explore alternatives to the existing supply chains and provide a real competitive advantage.

- A total of four meetings per year of the Irish Oyster Packers Group.
- A trial of using the Ocean Perfect transport system from Ireland to The Netherlands over a three-month period and production of a report on the feasibility of live shellfish transport by this mode of transport.

Budget: €112,000

Achievements/Spend

A total of four meetings of the Irish Oyster Packers Group were held in 2020 with three held virtually due to travel restrictions.

BIM engaged in a trial to explore the feasibility of a cost-effective transportation model, with Ocean Perfect, based on the transportation of oysters and crab to Yerseke, Netherlands using the latest container systems technology. A full report was produced detailing:

- The operation from the source producer locations to the Yerseke facility
- Preparation of performance reports during the trial, including any shortcomings

- Report on the costs of the operation
- Feedback from producers
- An assessment of the operation and where appropriate, suggestions for improvements
- Comparison with other methods in terms of efficiency, timelines and costs

The review covers the operations and costs up to the point of delivery at the Yerseke facility and does not include later processing. Costs for the onward distribution of the products to China were also examined as an example of the end-to-end supply costs and the relative scale of the Ireland to Yerseke transport component. The costs used within the report are based upon a combination of actuals and estimates provided by the third-party logistics companies, at a specific point in time. The costs will vary over time.

The key component of the Ocean Perfect transportation system for live shellfish is a specially designed tank, called a Serve the Sea Unit (SSU). The SSUs are fitted with a transferable lever-mechanism and isolated pump system which can be connected to 12V or regular 220V connection, which allows it to be transported in regular refrigerated trucks and can be installed at any point-of-sale for seafood.

Although the trial was not able to demonstrate the full capability of the Ocean Perfect logistics operation it has provided an opportunity to evolve an effective route to market for Irish shellfish producers. Accepting the cost estimates provided by Ocean Perfect, it indicates that the operation is competitive against other routes to market, particularly to mainland Europe. Using the container ships from Dublin to Rotterdam and Zeebrugge provides an alternative to the UK land bridge. The Ocean Perfect transport system in conjunction with the holding tanks at Yerseke provide an excellent solution to extending the shelf life of products, which opens up new market opportunities in Europe and distant locations. If logistics costs can be kept low through high levels of asset utilisation and economies of scale, then the route to market will be competitive against other country's producers. The philosophies of "competition of supply chains" or "co-opetition" are relevant to this analysis. The use of consolidation centres will allow smaller producers to use the service and larger producers to transfer to Yerseke more frequently. To ensure high levels of asset utilisation and enable more accurate demand forecasting the number of producers will need to be increased. The local airports of Amsterdam and Brussels offer a wide range of destinations, airlines, and frequency of flights, providing a reliable and consistent service to key destinations.

The rewards for creating an effective, collaborative, logistics solution are many, however the task of managing and co-ordinating the operation including all of its levels of seasonality, variability and uncertainty should not be underestimated. Overall, the trial was received by the industry as extremely positive and provided one of the only means to export to Asia during the closure of airline routes as a result of the Covid 19 pandemic. Over €0.5 m of shellfish was transported to The Netherlands during the trial. Companies are now looking at ways to use this mode of transport as a possible route to market in 2021.

SUMMARY OF SPEND:

Total Approved	€112,000
Total Eligible Expenditure	€112,000
Total Drawdown	€112,000
EU – 50%	€56,000
Exchequer – 50%	€56,000

Report by: Richard Donnelly

Date: 10th March 2021

BENEFICIARY: BORD IASCAIGH MHARA
PROJECT REFERENCE NUMBER: 20/KGS/DIS005
NAME OF PROJECT: Farmed in the EU – Aquaculture Remote Classroom
IMPLEMENTATION PERIOD: 1st January to 31st December 2020

Project Scope

‘Farmed in the EU’ is an EU wide educational programme conceived and initiated by the European Commission. The stated aim of the programme is to “raise your students’ awareness of the sector particularly in their community and help them explore issues related to food production, the environment and the different business and career opportunities aquaculture offers”.

The programme is a part of the European Commission’s ‘Inseparable’ initiative, which “aims to highlight the benefit of eating, buying and selling sustainable seafood”. The programme is open and available to all member states. Ireland is the second country to engage with this programme and have developed the unique Farmed in the EU - Aquaculture Research Classroom project.

Objectives

The ARC has been designed to travel throughout Ireland and accommodate up to thirty young learners at a time and provide one full day of an interactive learning experience. The learning experience is focused on positively engaging young people about aquaculture and related topics with the express objective of fostering knowledge and understanding of aquaculture and how it relates to learners and their community. The content addresses strand of SESE Science, SESE Geography and SPHE Education curriculum as set down by the Department of Education and Skills, this ensures that the learning day contributes to knowledge of aquaculture while meeting some other requirements that have been set down by the Department of Education.

The programme has been planned with a target of delivering to approximately twenty-five learners per day for the bulk of the primary school year, the project operates to a target of no less than thirteen teaching days per month for the school year, but with the expectation that operational performance above this level in normal circumstances. It should be noted that there is a need to allow for travel between schools, set-up times, vehicle reconfiguration and occasional cancellations by schools, therefore twenty day per month deployments would be considered very ambitious.

Budget: €250,000

Achievements/Spend

The ARC visits schools on the basis of ‘Expressions of Interest’ submitted via the project website www.aquaculture.ie, operations are scheduled in a manner that seeks to minimize travel and specific areas that demonstrate high demand are timetabled to maximise impact and reduce cost.

The first year of the project 2019 was extremely successful with all school visits received extremely well and demand exceeding delivery capability. A total of nearly 5,000 visitors boarded the ARC in 2019. In 2020 due to the closure of schools in March due to the Covid 19 pandemic the delivery of the ARC programme was moved to an online format. Pupils were given access to the video content and specific classes were delivered online directly to pupils. Over 1,000 pupils attended these online presentations from all regions of Ireland.

Four specially made online videos were produced and broadcast to schools. The subject of the four videos were:

- What is Aquaculture?
- The Nutrition of Seafood
- Aquaculture and the Community
- Sustainable Irish Seafood

The content briefly covers the history of farming and food production before introducing aquaculture as a farming process, the content places aquaculture in a European and in an Irish context and frames the evolution of the practice over time and the emergence of the modern Irish aquaculture industry. The content also introduces the food pyramid, discusses healthy eating and sustainability.

The content is tailored to 5th and 6th class pupils in terms of scope, depth, and complexity. Supporting materials such as posters and project idea leaflets were also developed in 2020. BIM propose to encourage ongoing learning and interest in aquaculture by encouraging participant schools to complete follow up activities as per the Farmed in the EU guidelines and to submit these into a competition managed by the implementing organisation.

SUMMARY OF SPEND:

Total Approved	€250,000
Total Eligible Expenditure	€250,000
Total Drawdown	€250,000
EU – 50%	€125,000
Exchequer – 50%	€125,000

Report by: Mairtin Walsh

Date: 10th March 2021

BENEFICIARY: BORD IASCAIGH MHARA
PROJECT REFERENCE NUMBER: 20/KGS/DIS001
NAME OF PROJECT: Taste the Atlantic
IMPLEMENTATION PERIOD: 1st January to 31st December 2020

Project Scope

Taste the Atlantic (TTA) was established as a joint initiative of Bord Iascaigh Mhara and Fáilte Ireland (FI), the initiative emerged after FI launched the very successful Wild Atlantic Way project. The Irish aquaculture industry is disproportionately distributed along the western seaboard and the emergence of the Wild Atlantic Way initiative has created a dedicated coastal tourism route in very close proximity to the majority of Irish aquaculture production sites. The purpose of the Taste the Atlantic project is to stimulate interest and economic opportunities in aquaculture based rural and food tourism and to provide a positive representation of the Irish aquaculture amongst domestic and international visitors.

The TTA project is focused on creating a cooperative, dual-agency approach to development in the aquaculture/seafood/tourism sector. The TTA project was implemented by two agencies with appropriate specialisation and expertise, BIM supported aquaculture producers directly within their core activities and provide information and interpretative materials to allow public and visitor to learn about aquaculture. Fáilte Ireland supported the development of tourism products and activities by producers and stakeholders within the sector. There is clear separation between the roles of the agencies in this project and no duplication can occur.

The TTA initiative is critical to creating better understanding, acceptance, and public support of aquaculture along the western seaboard. The successful coexistence of aquaculture and tourism must be promoted to the public to ensure that the 'social licence' for aquaculture endures and that it is abundantly clear that aquaculture and leisure activities and tourism are not mutually exclusive. Failure to deliver positive public engagement about aquaculture and marine tourism could contribute to negative public perceptions, opposition to sustainable development and difficulties for the industry in applying through the aquaculture licencing process and the emergence of a narrative that aquaculture does not support coastal communities whereas, in fact, the opposite has been shown to be true.

Objectives

BIM worked closely with the Irish aquaculture industry and Failte Ireland to develop new aquaculture related visitor experiences along the WAW that contributed to a much-improved understanding of the aquaculture sector and ensuring wider public acceptance of aquaculture as a food producing sector. These visitor experiences about aquaculture and how it contributes to communities in numerous ways (direct/indirect employment, production of premium quality seafood, increased sales/consumption of locally produced seafood) are extremely important for the future development of the sector.

Budget: €136,000

Achievements/Spend

Working in conjunction with Failte Ireland and in light of changing circumstances within the Irish tourism sector as a result of the Covid-19 pandemic a number of changes were made to the original plan. One of these was to capitalise on the new e-commerce trend. A full survey of the 21 producers was conducted to examine what level of e-commerce and web presence each of the companies had. The results indicated a low level of expertise in this area and that it could be significantly developed. Therefore, a training programme in e-commerce was developed in partnership with Failte Ireland. Two full day courses were run

for each of two groups of Taste the Atlantic producers. In addition to this training was provided on how best create a visitor experience. This led to significant increase in revenue for many of the producers.

As part of the knowledge transfer about aquaculture a series of printed and online information was developed detailing the processes involved in the culture of salmon, oysters, and mussels. To complement this some video material was also created and shared with the producers and Failte Ireland. range of information material including species leaflets and profiles of the two one producers along the Taste the Atlantic route were produced. A webinar was also held with well-known Irish chef and a producer of the Taste the Atlantic route. The webinar attracted over 300 participants and provided an excellent opportunity to discuss the merits of Irish aquaculture.

As part of this programme transfer of knowledge on aquaculture to the foodservice sector was also deemed an important part of gaining 'social license'. An onsite trip to a number of aquaculture installations was conducted using the Chef Network. This proved to be extremely beneficial and unfortunately a second trip planned for later in the year was postponed due to Covid 19 restrictions. Some other development works at Taste the Atlantic producers' sites were also curtailed due to the pandemic.

SUMMARY OF SPEND:

Total Approved	€136,000
Total Eligible Expenditure	€136,000
Total Drawdown	€136,000
EU – 50%	€68,000
Exchequer – 50%	€68,000

Report by: Mairtin Walsh

Date: 10th March 2021

BENEFICIARY: BORD IASCAIGH MHARA
PROJECT REFERENCE NUMBER: 20/KGS/DIS003
NAME OF PROJECT: Aquaculture Accelerator Programme
IMPLEMENTATION PERIOD: 1st January to 31st December 2020

Project Scope

The focus of this work is to build on the BIM Accelerator Programme conducted in 2018 and 2019 on encouraging new and innovative companies in the aquaculture field. This will involve attracting new companies to Ireland and investment with the assistance of experts and relevant State organisations. Existing companies from the 2018 and 2019 programmes will also need support. The concept behind an aquaculture accelerator programme is to fast track the development and growth of companies in this sector.

Objectives

- Recruit up to ten companies from Ireland to participate on the BIM Aquaculture Accelerator Programme.
- Engage with Hatch to design and develop a suitable aquaculture accelerator programme for Irish companies. Locate a suitable location to host the programme.
- To assess applicants and finalise group to participate in a programme based in Ireland for two weeks.
- Present successful companies to potential investors or participation on Hatch International Accelerator Programme.
- Assist companies in follow up and mentoring following the completion of the programme.

Budget: €236,000

Achievements/Spend

The BIM Aquaculture Accelerator Programme recruited Hatch Ltd. to run and develop a tailor-made two-week programme focused at attracting Irish start-up companies in the aquaculture sector. A significant amount of time was invested in setting up the programme to be hosted in the RDI Innovation Hub in Killorglin Co. Kerry. Unfortunately, due to the restrictions placed on companies traveling in May the programme was deferred until October. Travel restrictions associated with the pandemic were imposed again in October therefore, the two-week programme was moved onto an innovative online platform called Remo. The structure of the programme allowed direct one to one mentoring for the total of thirteen companies that participated in addition to the group workshops and project work. Participants also had the opportunity to pitch to investors at the end of the programme.

Project statistic for 2020 are as follows:

- Companies that were screened/applied for hatch workshop in 2020 - 38
- Companies accepted onto the programme - 11
- Participants – 13

List of expert speakers and topics covered:

- Georg Baunach (HATCH) - Global Aquaculture Landscape
- Björögolfur Hávardsson (NCE Seafood Innovation Cluster) - Norwegian Salmon Industry
- Alex Marsh (Cargill) - Aqua Nutrition and Industry
- Wayne Murphy (HATCH) - Building a Business
- Christian Rangen (Strategy Tools) - Strategy Development
- Carsten Krome (HATCH) - Venture Capital & Aquaculture / Alternative Seafood
- India Boyer (HATCH) - Getting Investor Ready

- Tom Prins (Aqua-spark) - Global Aquaculture Investment
- Dylan Howell (HATCH) - Market Intelligence
- Claude Kaplan (HATCH) - IP Strategy & Mgmt
- Tanja Hoel (HATCH) - Innovation & The Norwegian Experience
- Einar Wathne (Former Cargill Aqua Nutrition) - Industry Progress & Developments
- Adam Taylor (Yalelo) - Global Aquaculture Entrepreneur - Building a successful business.
- Goncalo Santos (HATCH) - How to manage Industry engagement.
- Steven McCann (SOSV) - Venture Capital - What you need to know!
- David Murphy (AquaTT) - Grant / EU Funding process

While the event was conducted online it was received extremely well by all participants and several follow up mentoring sessions continued after the workshops. The result was that four of the participating companies received funding for their projects and were able to advance them into commercial operations. In addition to the workshops a significant amount of time was invested in developing collaborations with the IATiP project and developing contacts with both academic and research institutes in order to provide a pipeline of new innovative ideas for aquaculture. The slight underspend was due to not hosting the workshops in the RDI Hub in Killorglin.

SUMMARY OF SPEND:

Total Approved	€236,000
Total Eligible Expenditure	€216,170
Total Drawdown	€216,170
EU – 50%	€108,085
Exchequer – 50%	€108,085

Report by: Richard Donnelly

Date: 10th March 2021

BENEFICIARY: BORD IASCAIGH MHARA
PROJECT REFERENCE NUMBER: 20/KGS/DIS004
NAME OF PROJECT: Aquamona Programme
IMPLEMENTATION PERIOD: 1st January to 31st December 2020

Project Scope

Aquaculture is the world's fastest food production sector and expansion is taking place globally. An opportunity exists for Ireland to act as a base for companies offering products and services to this global sector. In addition to companies offering solutions to challenges within the Irish industry, the opportunity exists for such companies to develop export led bases here. Partnering with Bord na Mona on the current IMTA farming project, BIM is seeking to attract new ventures associated with a central hub for aquaculture innovation and production on the Mount Lucas site in county Offaly. The work entails scoping stakeholder interest and engagement through developing a 3d model and presentation of proposed activities. These clients may be investors, equity groups, state agencies and other aquaculture producers or companies operating in this sector. This phase of the project will explore opportunities such as smolt production, other species production and aquaculture innovation from feed trials to genetic studies and other areas of innovation. The overall concept is to attach world leading aquaculture enterprises to the location in Mount Lucas. This will create a synergy of aquaculture knowledge based around one location like other innovation hubs around the world. In addition to this, it will begin to deliver much needed employment opportunities to an area of the country that is dealing with serious issues due to the cessation of electricity generation from peat harvesting.

Objectives

The objective of the project is to investigate all aspects of developing this hub in a central location where there are significant land and energy resources, but limited employment opportunities.

Current aquaculture activities that have been conducted in this area by BIM in partnership with Bord na Mona have shown excellent potential for growing species such as perch and trout. In order to capitalise on this BIM will need to investigate a whole range of other aquaculture activities that could be conducted at this site. The potential for a whole range of enterprises from smolt production, recirculation systems and technical innovations could all take place in this location. The purpose of this analysis is to examine each of these opportunities and create whole new industry based in a part of Ireland where alternative employment is crucially needed. Without the expertise of BIM there is limited opportunity in developing this type of project in an area where new enterprises are so urgently required. Key objectives include:

- Stakeholder meetings
- Development of 3d model of site
- Development of project presentation

Budget: €10,000

Achievements/Spend

All key objectives were met including significant stakeholder engagement with state agencies including Enterprise Ireland, IFI, AIT, and NUIG. Representative bodies and commercial aquaculture companies were engaged. A 3d mock-up was generated in addition to presentation material for PowerPoint presentations of project concept and proposed development.

SUMMARY OF SPEND:

Total Approved	€10,000.00
Total Eligible Expenditure	€ 6,352.50
Total Drawdown	€ 6,352.50
EU – 50%	€ 3,176.25
Exchequer – 50%	€ 3,176.25

Report by: Damien Toner

Date: 10th March 2021



BENEFICIARY: BORD IASCAIGH MHARA
PROJECT REFERENCE NUMBER: 20/KGS/STS-BG002-BR024
NAME OF PROJECT: Shellfish hygiene and food safety
IMPLEMENTATION PERIOD: 1st January to 31st December 2020

Project Scope

To improve the overall performance and competitiveness of Irish aquaculture farming; ensuring consumer safety, aquatic animal health and welfare is of the utmost importance. Bivalve molluscs can accumulate pollutants and viruses from within the marine environment and thus, in line with public health requirements, bivalve mollusc farmers must better understand the risks in their production areas.

Norovirus (NoV) is a serious threat, particularly in the winter months. While present in the general population this virus is deemed responsible for outbreaks of winter vomiting bug. In Ireland oysters can cause an accumulation of this virus by filtering water that can at times contain this virus. This is of particular concern over the winter months when, with limited sunlight, the virus can remain active and accumulate in the gut and flesh of the oyster. During this period, certain individuals consuming this product may then suffer the effects of this virus. This can lead to a negative impact on consumer confidence and at times create a health risk. A key element of quality assurance is demonstrating absence of NoV in oysters at levels that may cause illness.

In 2017, the European Food Safety Authority's (EFSA) Panel on Biological Hazards (BIOHAZ Panel) concluded in its Risk Assessment that the most effective public health measures to protect consumers from exposure to norovirus in oysters was to produce oysters in areas which are not contaminated or to prevent contamination of mollusc production areas. According to the Panel, methods currently used to remove NoV in shellfish should be improved. Due to these initial findings, a 2-year (2017-2019) EU-wide Baseline Survey on Norovirus in oysters was commissioned by the EU to provide information on overall consumer exposure and the impact this would have on an oyster producer.

Upon completion of this 2-year EU Base-line survey, the Panel recommended establishing acceptable limits for the presence of NoV in oysters that are harvested and placed on the market in the European Union. The analyses of the substitution approach showed that selection of a potential limit within a microbiological criterion close to or lower than the LOQ (for example, less than 300 copies, given the current test used in this survey) would be difficult to apply. With this in mind, the previous phase of this project (19/KGS/STS011.3) has proved invaluable to the Irish Oyster Industry. As each Member State presents their case to the Commission, it is important that this data set continues to be enlarged in order for Ireland to have a statistically significant data set of our Norovirus profile.

Objectives

This study:

- Analysed the Impact, Management and Prevalence of Norovirus in oyster production areas around the coast of Ireland.
- Explored possible scenarios & systems potentially capable of eradicating & reducing Norovirus to an acceptable level for human consumption thus,
- Enhanced Norovirus Mitigation Plans by establishing Optimum Depuration Systems Validation.
- Revised the recommendations within the Food Safety Management System manuals to include the most up to date risk assessments and best practice in HACCP.

Budget: €93,000

Achievements/Spend

This project established the following overall impact of depuration (increased time and temperature) on the reduction of norovirus in oysters:

63.4% Reduction in Norovirus GI & an 85.4% Reduction in Norovirus GII

The study confirmed that starting Norovirus concentration levels are key to the successful reduction in norovirus to levels <LOQ, for example:

- Pre-depuration concentration levels of <1000 copies/g reduced by 78.6%
- Pre-depuration concentration levels >1000 copies/g reduced by 40.0%

Comprehensive data on the prevalence of norovirus in production areas:

- Very consistent winter contamination
- Positive impact on norovirus contamination due to COVID-19 restrictions, but norovirus has not gone away.

End-product oysters:

- Overall lower concentrations observed in end-product compared to production areas.
- 70% reduction

“Enhanced” Depuration:

- Better depuration rates observed for GII (~85 %) over GI (~64%)
- Better depuration outcome for samples with <1000 copies/g (NoV GII) compared to samples >1000 copies/g.

Proposed norovirus standard (500 copies/g):

- Lesser impact of standard on the end-product originated in Class A production areas compared to Class B/Seasonal A production areas.

This study contributed to an inaugural national Norovirus profile (substantiated by the National Reference Laboratory), thus providing a concise data set which enabled:

- The protection of aquatic animal and ecosystem health, public health and safety and aquaculture businesses.
- A safer product supporting the European Commission's Agri and Food Security Policies as food production must be increased in an economically, safe & socially sustainable manner.
- Greater quality control procedures.
- Quality assurance to the consumer.
- Secured markets.
- A viable, safe, Irish Oyster Industry

Initial Food Safety Management System manual revision & gap analysis identified obsolete clauses & the need to update manual content to reflect the most up to date legislative & best practice requirements.

SUMMARY OF SPEND:

Total Approved	€93,000.00
Total Eligible Expenditure	€87,988.25
Total Drawdown	€87,988.25
EU – 50%	€43,994.12
Exchequer – 50%	€43,994.12

Report by: Vicky Lyons

Date: 10th March 2021



BENEFICIARY: BORD IASCAIGH MHARA
PROJECT REFERENCE NUMBER: 20/KGS/STS-BG003-BR019
NAME OF PROJECT: Climate adaption and resilience for the aquaculture sector
IMPLEMENTATION PERIOD: 1st January to 31st December 2020

Project Scope

For the purpose of the project report the Invasive Alien Species (IAS) and the Natural Capital Accounting (NCA) work are reported separately.

IAS

Aquaculture operations are a known vector for invasive species. Invasive Alien Species have the potential to cause large impacts on the natural environment, the quality of aquaculture products and affect how aquaculture operations are conducted.

It is important therefore that the aquaculture sector is proactive on addressing this issue to minimise risks and ensure the sustainability of their operations. BIM is in a prime position to facilitate this work.

NCA

Natural Capital is the available stock of renewable and non-renewable resources that support human life. Natural Capital Accounting is fast emerging as a tool to inform decision making and support sustainable management of activities. Following on from an initial assessment in 2019 this project seeks to test and demonstrate the applications of Natural Capital Accounting for the seafood sector. Given its standardised approach to organising and compiling environmental and economic data, the United Nations' System of Environmental-Economic Accounting (SEEA) is a leading approach to developing an integrated information set. It is already being used in Ireland and was identified as the most appropriate framework for this work.

Objectives

The objectives of the IAS project are to support the aquaculture to be proactive on addressing Invasive Alien Species to minimise risks and ensure the sustainability of their operations to be achieved through the retention of an Alien Species advisor and through the development and launch of a smartphone app for use by the aquaculture sector to help identify and report potential alien species.

The objectives of the NCA project are to:

- test and demonstrate the application of Natural Capital Accounting for the Irish Seafood sector, using the United Nations System of Environmental-Economic Accounting
- improve the understanding of the complex relationship between seafood sector activities and the natural environment, and
- contribute to the sustainable management of the seafood sector and the marine environment.

Budget: €110,000

Achievements/Spend

IAS

BIM contracted the services of expert alien species advisors for 2020. The following work was undertaken:

- surveys in key aquaculture bays and non-aquaculture bays around Ireland to contribute to the baseline species register.
- Reports provided for surveys over three year period from 2018-2020.

- Risk Assessments were produced for key species of concern.
- Rapid response surveys were carried out for both Chinese Mitten Crab and *Sargassum muticum*. Additional monitoring was conducted for Chinese Mitten Crab.
- Guidance was provided to support industry challenges and policy responses e.g., MSFD Descriptor 2 reporting.
- Contributions to and oversight of Risk Assessments for aquaculture activities.

NCA

The project to test and demonstrate NCA for the seafood sector was initiated during 2020. Contractors were appointed together with internal and external steering committees who took part in training during December 2020. An assessment process was carried out to identify an appropriate case study location and data collection initiated. This project will continue throughout 2021.

The purpose of the demonstration accounts is to support the Irish seafood industry in the management of ocean resources sustainably, and to support seafood industry operators to create value. It is intended that this will manifest through four priority applications of accounting information:

- preparing data and information for the seafood industry to support their participation in Marine Spatial Planning
- improving sustainability performance and communicating the results
- reporting on sustainable development goals (SDG)
- assessing the sustainability of the seafood sector in terms of
- natural capital
- produced, human and social capital.

The success of the project will depend on the delivery of these four applications. The project is an important contribution to the national Natural Capital agenda as it is the first project that focusses on the marine sector in Ireland.

SUMMARY OF SPEND:

Total Approved	€110,000
Total Eligible Expenditure	€110,000
Total Drawdown	€110,000
EU – 50%	€55,000
Exchequer – 50%	€55,000

Report by: Grainne Devine

Date: 10th March 2021

BENEFICIARY: BORD IASCAIGH MHARA
PROJECT REFERENCE NUMBER: 20/KGS/STS-BG003-BR023
NAME OF PROJECT: Standards and Certification
IMPLEMENTATION PERIOD: 1st January to 31st December 2020

Project Scope

Standards and certifications are now a key mechanism for businesses wishing to translate requirements, both product and process specifications, to other parts of the supply chain. There is an increasing global requirement for the use of accredited certification schemes in providing assurances of more sustainable practices in seafood production and more recently for the participation and assessment of accredited certification schemes to global benchmarking initiatives.

The production of organic aquaculture has been the success story of the organic movement in Ireland, with organic salmon production leading the way, and known as the world pioneer in the organic salmon sector.

The main goals of this project were:

- Continued alignment of accreditation, organic approval and GSSI status of BIM's current Certification Quality Aquaculture (CQA) certification schemes & prestigious certification to MSC Scheme.
- Maintained premium position in the marketplace.

Objectives

The principal objective of this project is to support the production of high-class farmed Irish seafood and to differentiate aquaculture products in the marketplace through quality, organic and eco labelling, to satisfy consumer demand for trustworthy products whilst providing a fair marketplace for producers and processors and to keep pace with and lead in this rapidly evolving aspect of the international seafood market.

CQA

The BIM Certified Quality Aquaculture Programme (CQA) is an accredited certification Programme which is managed according to ISO 17065, EU Organic Regulations and DAFM Approval, and GSSI (Global Sustainability Seafood Initiative) benchmark approval requirements to ensure that Certification Bodies (CBs) operate in a consistent and controlled manner and so that applicants and certified clients manage their businesses and market their products in full conformity with the criteria defined in the Programme standards. The principal objective of the BIM CQA Programme is to support the production of high-class farmed Irish seafood and to differentiate aquaculture products in the marketplace through quality, organic and eco labelling.

The CQA Programme uses aquaculture facilities as its unit of certification and the CQA standards main objectives are to ensure food safety, quality, organic nature, and environmental responsibility, via verification testing and traceability criteria required to be in place within the type of operation each standard cover. The standards are performance based and can be defined as defining objectives (e.g., food safety, product traceability, biosecurity management, integrated pest management, nutrient impact reduction, sustainability of raw materials, nature and conservation, environmental management, feed specification, etc.) with thresholds and documented evidence in audit reports.

BIM's CQA Programme was developed by a Technical Advisory Committee (TAC) with representatives from all parts of the supply chain, from feed to fork and includes participation of FSAI. Programme integrity is managed through a quality management system detailed in the Governance and Control Manual available on the BIM website. <http://bim.ie/media/bim/content/our-services/your-environment/fish-farmers/cqa/BIM-Master-1-CQA-QMS-Governance-Control-Manual.pdf>

GSSI recognition of CQA Programme

BIM's CQA Programme is a GSSI-recognised scheme. The endorsement of our accredited CQA Programme to a global benchmark initiative 'future proofs' the provenance of our farmed Irish Seafood and gives our producers access to the premium markets. BIM's CQA Programme has successfully participated in the global benching initiative, GSSI (Global Sustainable Seafood Initiative), which is process underpinned by the FAO guidelines to assess seafood certification programmes and has become widely recognised as playing a leading role in creating global alignment on seafood certification. The CQA Programme underwent its first GSSI Monitoring of Continued Alignment (MOCA) Process in 2020. This MOCA process is carried out every 18 months.

MSC Certification of Ireland's Rope and Bottom Mussel Sector

Certification to the MSC standard provides enhanced reputation, better visibility; improve dialogue with stakeholders, a pathway for improvements, protected livelihoods, and access to new markets, secure markets, and promotional opportunities.

A central certification for the whole mussel industry represents an innovative approach to the certification process and provides best value for money for the whole industry. For the seabed cultured mussel sector continued certification is required to ensure access to high value markets and is a key partner to Origin Green for their sector. For rope mussels, the certification will provide access to high value markets and allow the product to compete with Scottish rope grown mussels.

Budget: €168,600

Achievements/Spend

- Governance and Operational Management of CQA Quality and Organic certification system managed by service provider in line with Commission Regulation 710/2009 & GSSI requirements, reports issued for CQA CB review, CQA Internal Audit and CQA Annual Management Review.
- ISO 17065 Accreditation for the Programme.
- Certification audits completed by the Certification Body for all CQA certified companies.
- Completion of GSSI MOCA assessment.
- Completion of assessment of compliance for rope and bottom grown mussels to MSC standards.
- MSC Certification of Ireland's Rope and Bottom Mussel Sector.
- Commencement CQA Farm and Processing Standard review in July up to December 2020. This Standard review and development will continue into 2021).
- A total of 7 meetings were held in 2020 including a CQA Oversight Committee Meeting, CQA TAC Meeting, Certification Body Review Meeting, CQA Team and CQA Certification Body meetings.

SUMMARY OF SPEND:

Total Approved	€168,600
Total Eligible Expenditure	€168,600
Total Drawdown	€168,600
EU – 50%	€84,300
Exchequer – 50%	€84,300

Report by: Vera Flynn

Date: 10th March 2021

BENEFICIARY: BORD IASCAIGH MHARA
PROJECT REFERENCE NUMBER: 20/KGS/STSBG0012
NAME OF PROJECT: Co-ordinated Local Aquaculture Management Systems (CLAMS)
IMPLEMENTATION PERIOD: 1st January to 31st December 2020

Project Scope

Coordinated Local Aquaculture Management System - CLAMS is a longstanding nationwide initiative implemented by aqua-farmers for the organised growth and sustainable development of aquaculture within the context of marine spatial planning. CLAMS has been widely adopted by fish and shellfish farmers since 1998 in the regions around the coastline and bays of Ireland where aquaculture is practiced. The approach is a locally based and all-embracing system of farmers working proactively to formulate coordinated practice, maximise production and environmental management with minimal conflict with other resource users.

Historically, CLAMS Groups have created detailed area plans for their operating regions which formed the basis of the strategies and activities for growth and sustainable development over the last 20 years. The process of agreeing and pursuing the coordinated activities remains a key objective for the agencies and departments that support CLAMS.

At a national level CLAMS is co-ordinated by a group chaired by the Director of the BIM Seafood Technical Services Business Unit. BIM's role in leading and developing the CLAMS process reflects the primary objective of BIM policy which is to expand the volume, quality and value of output from the fisheries and aquaculture sectors. BIM's approach is to focus on the opportunities for growth in these sectors while seeking to alleviate constraints that impede development.

Objectives

Ireland's bays and inshore coastal waters are national, natural resources that need to be managed. The unique and important top-down and bottom-up communications system established under CLAMS allows the aquaculture sector to be better informed and thus comply with Union and National legislation as well as being prepared to integrate and contribute to emerging issues. In this respect CLAMS has become a living process which has delivered measures and programmes of value to industry members and to regulators. In 2020 this was to be achieved via;

- An external national CLAMS review and multiple local plan review to ensure integration of the CLAMS principals into current and emerging Union and national policies. Achieved by the appointment of external consultant to complete the project (Contract value calculated following competitive tender) and a project collaborative tool to deliver CLAMS review projects remotely.
- Navigational management systems in line with international, Union, and National requirements, while minimising visual impact associated with aquaculture operations. Achieved via vessel and equipment hire in support of installations, visual assessments, beacon assembly.
- External reports reviewing the spatial overlap of aquaculture in areas regarded as being important in terms of archaeological heritage. Achieved via appointment of an external consultant to complete the project.
- Removal of plastic and other waste material from the aquatic environment to protect the health and aquatic animals and ecosystems and public health and safety. Skip hire, waste charges, hire of specialist equipment.

Budget: €125,000

Achievements/Spend

Plans

A new re-constituted CLAMS executive met early in the year to discuss the proposed plans for production of an over-arching National CLAMS document as well as the production of five addendums in areas with existing documents which were by then dated having been initially produced up to ten years ago.

Consultants were appointed and the following were produced:

- Updated National CLAMS Document
- Regional plan addendums in five areas, Bannow Bay Roaringwater Bay, Clew Bay, Mulroy Bay and Carlingford Lough. These addendums included five priority actions within each area of relevance to that area to be worked on into the future buying in the local producers in these areas to the CLAMS process as a live and active concept. They also take on board, the integration and acknowledgement of new concepts of environmental protection, health and safety and national heritage legal responsibilities.

Sustainable Unified Marking Schemes

Safeguarding navigation in areas with substantial aquaculture activity has been undertaken during the year through the maintenance of existing SUMS and the installation of new SUMS. Maintenance was undertaken in a number of areas.

New SUMS were completed in the following areas;

- Roanacarrig Phase I, Co. Cork
- Kinvara, Co. Galway
- Ballinakill, Co. Galway
- Poulmasherry, Co. Clare

SUMS extended in the following areas;

- Killala, Co. Mayo
- Clew Bay North and South SUMS

Archaeological Assessment

Reviews of the spatial overlap of aquaculture in areas regarded as being important in terms of archaeological heritage allow aquaculture operators to comply with National Legislation while also informing marine spatial planning.

During 2020 two archaeological surveys were undertaken and completed;

- Wexford Harbour
- Killmackilloge, Co. Kerry

SUMMARY OF SPEND:

Total Approved	€125,000
Total Eligible Expenditure	€125,000
Total Drawdown	€125,000
EU – 50%	€62,500
Exchequer – 50%	€62,500

Report by: Mike Murphy

Date: 10th March 2021

BENEFICIARY: BORD IASCAIGH MHARA
PROJECT REFERENCE NUMBER: 20/KGS/DIS006
NAME OF PROJECT: Aquaculture Business Mentoring Panel
IMPLEMENTATION PERIOD: 1st January to 31st December 2020

Project Scope

The seafood sector has unique challenges that require specialist skills to support the industry remain competitive. The purpose of the Business Mentoring Panel is to form a group of suitably qualified specialist advisors that BIM can choose from, with the skills and experience necessary to advise and support Irish aquaculture businesses in relation to opportunities and challenges that they are faced with.

The majority of the work under this project relates to services as a consequence of the UK's exit from the EU. The project focuses on supporting aquaculture companies to identify and action key steps in relation to customs, tariffs, and non-EU trade requirements.

Objectives

Specialist advisors are required to advise and support individual aquaculture businesses to address the challenges impacting their business and capitalize on potential opportunities. This involves developing a tailored plan for each client, supporting the client through the implementation of the plan and deliver an end of project report to the client and BIM. The main objective of the project was:

- To minimize the disruption on aquaculture businesses because of Brexit and support companies to "Get Brexit Ready".

Budget: €40,000

Achievements/Spend

Twelve aquaculture companies were supported in "Getting Brexit Ready". Companies were supported in identifying areas where they were underprepared for Brexit and assisted in actioning key steps in the following areas: Import and Export Customs Procedures, Border Control Procedures and Requirements, Customs Classification, Lodging declarations with Revenue and HMRC, setting up Deferred Payment Accounts, Advice on import or export to Northern Ireland, Review of VAT position in Ireland and the UK, Duty mitigating procedures, and AEO authorization. This has enabled companies to better manage the disruption to trade caused by Brexit.

SUMMARY OF SPEND:

Total Approved	€40,000
Total Eligible Expenditure	€40,000
Total Drawdown	€40,000
EU – 50%	€20,000
Exchequer – 50%	€20,000

Report by: Gavin McGrath

Date: 11th February 2021