

Novel Fishing Technologies to improve Environmental Performance

Project Outline:

The proposed work programme will follow three key themes: Landing Obligation; Carbon Emission and Seabed Impact Mitigation; Novel Gear Technologies and Methodologies. Where Covid-19 protocols restrict or preclude BIM from going to sea, trials will be carried out on a fisher-sampling basis. Fisher sampling is also effective for preliminary assessment of new gear measures which feeds into full-scale assessment when Covid-19 protocols permit.

Landing Obligation

Demonstration of a relatively high level of species post-capture survival can result in an exemption from the landing obligation which means that fish can be put back to sea alive and catches are not deducted from vessel quotas. A survivability study will be conducted on a key landing obligation species using captive monitoring or potentially tag and release techniques. Landing obligation exemptions for species such as Nephrops and plaice are legally granted until the end of 2023. BIM will continue to develop techniques around monitoring survival and data analysis to ensure we are well placed to meet any new requirements to reassess survival of key species such as Nephrops.

A 2021 preliminary assessment of lights on the raised-fishing line showed significant potential to reduce unwanted fish catches in demersal trawl fisheries targeting fish species. COVID protocols permitting, further research in this regard is planned in 2022.

Carbon Emission and Seabed Impact Mitigation

Potential gear related methods to reducing fuel use/carbon emissions include lowering drag through reduced netting, improved gear hydrodynamics, enhanced monitoring of gear performance. In addition to reducing drag and carbon emissions, lower seabed-contact gears also improve biodiversity. These include semi-pelagic or off-bottom otter doors, rolling versus hopper-based footgear or off-bottom trawls to target demersal fish species which occur a few metres above the seabed.

A wide range of reduced seabed contact gear options are subject to ongoing international research. A critical success factor is engaging industry at the start of a project in determining what is technically feasible and commercially viable from an Irish perspective. This project proposes to conduct a flume tank workshop in Newfoundland in collaboration with key Irish skippers and net makers, and the Centre for Sustainable Aquatic Resources, a leading research body in this field. A potential 2022 gear trial will focus on reducing drag in the relatively fuel intensive Nephrops fishery using novel otter boards or other gear components.

As vessels move towards lower impact gears, systems to monitor gear parameters are essential to optimise performance and efficiency of the gear. BIM staff have provided an advisory service to skippers by accompanying them at sea with a set of gear sensors however gear sensor technology has developed considerably both in terms of the operational data that can be captured as well as remote communications. BIM is proposing to acquire a new set of sensors which BIM can loan to skippers and link in remotely to help optimise their lower impact gears.

Novel Gear Technologies and Methodologies

Smart systems for monitoring operational efficiency on board fishing vessels can provide data on a range of operational and environmental parameters. This type of information can empower skippers to operate more efficiently. It can also greatly enhance assessment and demonstration of gear-based solutions, particularly reduced drag and improved fuel and carbon efficiency. It is proposed to plan to test and develop this type of system on board an Irish vessel in 2022.

Automated catch recognition through real-time net-mounted cameras and machine learning is a growing area of fisheries research. Working in collaboration with GMIT and DTU Aqua in Denmark, BIM is planning to develop capacity in this area. Although at a relatively early technological readiness level, this technology has major potential to substantially reduce fisheries environmental impacts and improve data quality for management purposes.

Collaborating with GMIT, BIM plans to develop approaches on integrating gear changes in stock forecasts and optimising selectivity outputs from catch comparison experiments. This work will be submitted for peer review publication which will help drive implementation of BIM developed solutions at management level.

To allow for this volume and scope of work, the project will require two positions to be placed with the fisheries conservation section. The role of these two positions will be to support the project work on developing sustainable fisheries technical solutions in response to the requirements of the Landing Obligation, Climate Mitigation, and other environmental and Common Fisheries Policy Challenges. They will develop and implement the projects above on environmentally friendly fishing gear and methods which assist the Irish fishing industry in meeting these challenges in accordance with the EMFAF. The two technologists will also assist the project on Climate Action in the fishing sector through their work on Carbon Emission and Seabed Impact Mitigation.

Project Objectives:

- Complete a minimum of four studies on board Irish fishing vessels which aim to improve the environmental performance of Irish fisheries.
- Develop a new gear advisory service to help industry optimise performance on novel reduced impact fishing gears.
- Run regional workshops with fishers on technical solutions.
- Develop a system for collating vessel operational efficiency data to empower skippers operate more efficiently and enhance assessment and demonstration of gear-based solutions.
- Develop experimental gear technology methodologies with one new paper submitted for peer reviewed publication.
- Collaborate extensively with key bodies externally and internally to acquire and provide technical insights for the benefit of the Irish fishing industry.

Expected Benefits:

- New fish handling and analytical techniques successfully developed for fish survivability studies in preparation for current exemptions ending in 2023.
- Major advances in BIM and industry knowledge and capacity around reduced seabed impact gears through flume tank workshop and collaboration with leading researchers in this field.
- Improved fuel and carbon efficiency in the Nephrops fishery through incremental improvements in gear design.
- Successful implementation of a new BIM gear advisory service and vessel operational efficiency monitoring system.
- Irish knowledge and capacity in the field of automated catch recognition greatly developed.
- BIM technical capabilities developed and benchmarked through publication of novel fisheries experimental methodology in peer reviewed journal.
- Effective engagement with industry through new gear advisory service and regional workshops.
- Societal support for fisheries gained through development of sustainable fishing practices.

Projected Cost: €524,000