

Development of a Fisheries Bio-economic Model

Project Outline:

Biological modelling of the fisheries relevant to Ireland will be carried out based on the most recent ICES data and following ICES methodologies for the estimation of quotas for the spectrum of possible fishing mortalities within the range of maximum sustainable yield.

The model will be written in universal “R” statistical code and incorporate mixed fisheries dynamics so that the effects of a proposed quota change in one fish stock is accurately measured in relation to the overall fishery (i.e., choke species impacts). The model will be coded in R statistical language. It will consist of biological, fleet and economic components. The biological component will incorporate ICES stock assessment datafiles and simulates the dynamics within mixed fisheries exploited by the Irish fleet. The fleet component will simulate the effects of fishing policy on the Irish fleet. The economic component that is linked to the biological and fleet components will estimate the direct economic impact and downstream impacts. The model will be designed to have a front end that allows ease of use by non-experts in statistical modelling and produces output of simulations on screen and as downloadable files.

The model should provide:

- Simulations of future stock sizes under fixed and adaptable scenarios
- Simulations of future fleet sizes under fixed and adaptable scenarios
- Simulations of future direct economic impact under fixed and adaptable scenarios
- Simulations of future downstream economic impact under fixed and adaptable scenarios
- Incorporate mixed species interactions to adequately simulate choke species scenarios
- incorporate information on gear selectivity trials to simulate any potential improvement in terms of extending the fishing season of affected fleets affected by the landing obligation and quota changes
- Capability of incorporating selectivity adjustments as part of simulations
- A thorough socioeconomic impact assessment of the EU TAC setting procedure and national quotas.
- Assess the impacts of quotas, choke species and technical measures

During 2020, the Marine Institute and CEFAS were awarded the contract to develop the model and several phases of the project have been completed in 2020 as follows:

- Phase 1: Collation, analysis and synthesis of available data on relevant stocks, fisheries and economic variables to condition the bio-economic model. Data has been collected from different sources (i.e., ICES, logbooks, sales notes, and BIM).
- Phase 2: Model development, including data input and validation, conditioning of the simulation model and structuring to ensure the bio-economic model framework is flexible enough to deal with the management scenarios envisaged

In 2021, phase 3, phase 4 and phase 5 of the project will be completed as follows:

- Phase 3: Continued model development through the inputting of economic variables. Based on economic data obtained from STECF AER reports and information provided by logbook data/sales notes for the Irish fleet, a fleet model as well as the price and cost model will be conditioned. After the economic models are conditioned, changes to the economic performance of the fleet can be assessed under the different management scenarios. With help of a simple employment multiplier the regional impact on employment will be calculated.

- Phase 4: Model interaction and dissemination development. This will focus on the development of an interactive tool to disseminate the outputs of the scenarios evaluated. The Marine Institute specialise in the development of R shiny dissemination tools, which make fisheries data more accessible and understandable to a wide range of end users.
- Phase 5: A detailed technical report detailing all aspects of the bioeconomic model will be provided once the model has been developed and fully tested.

Project Objectives:

The main aim of this project is to develop a fisheries bio-economic model that will simulate the activity of the Irish fishing fleet and describe as accurately as possible the mixed and single fisheries in which they operate. Using these simulations, it will be able to forecast the impacts on these fleets under different fisheries management scenarios, including changes in fishing opportunities, choke situations under the Landing Obligation and the implementation of gear selectivity and avoidance measures.

Expected Benefits:

Delivery of a fully operational bioeconomic model for the Irish fleet capable of assessing the impacts of quotas, choke species and technical measures.

Projected Cost: €105,000