

Cullen Scholarship: Ecology of Irish tunas (PhD Award)

Background

Tunas contribute significantly to the Irish economy, with albacore representing the 8th most valuable species quota (~€7M annually). Bluefin tuna have appeared regularly and in significant numbers in recent years off the coast of Ireland often coming within hundreds of meters from the shore. This may be linked to changing ocean conditions influencing bluefin tuna migration but it is difficult to know if such occurrences will persist over time. Atlantic distributions of both species are managed on a multiple-stock basis, however stock differentiation between and within management units remains unclear given a variety of data deficiencies (Nikolic et al 2017).

A new management plan for Bluefin tuna (BFT) in the Mediterranean and East Atlantic proposed by the EU was adopted at the 2018 annual ICCAT meeting in Dubrovnik. This allows for countries with no assigned quota, such as Ireland, to set up a recreational/sport catch/tag/release fishery. This allows member states to collect scientific data regarding the numbers of BFT swimming in particular areas and their migratory habits. The recommendations requires fishers to be trained in how to perform the tag and release to ensure survivability of the BFT and that the scientific data be submitted to ICCAT on an annual basis. A pilot fishery was established by DAFM and DCCAE in 2019 with 15 vessels authorised to catch, tag and release (CAR) Bluefin tuna. The fishery is to be reviewed annually.

Electronic tags (satellite, archival and acoustic) have emerged as powerful tools to reduce the uncertainty in scientific knowledge of these species and to inform the spatial and temporal patterns of distributions necessary for proper fisheries management. Tagging, genetics, and micro constituent analyses all provide the capacity to distinguish populations. Current tuna population models rely on biological assumptions concerning life history that are informed by tagging studies. Data obtained from electronic tagging improves modelling of key life history parameters including maturation, growth, natural and fisheries mortality. Using electronic tagging to reduce the uncertainty in these parameter estimates is vital to improving new assessment models and projecting accurate biomass assessments of each population, and this ultimately improves new efforts to develop operating models.

This proposal aims to enhance the current migration information on BFT taken in Irish waters (BIM satellite tagging in 2004/5, Marine Institute satellite tagging between 2016 and 2019). The data will be used in conjunction with long term local time series data on environmental parameters (Marine Institute data)) and global datasets, to characterize ocean conditions associated with BFT migrations into Eastern Atlantic waters in the past. The ability to use these relationships to predict future occurrences will allow conservation and management protocols to be developed for the species, which reflect changing migrations and distribution. In addition key knowledge gaps in our understanding of the use of Irish water by Albacore tuna will be investigated.

Proposal

We propose a structured four-year PhD project on a full-time basis. The project will aim to:

1. Use cutting-edge biologging approaches to explore the impact of CAR on bluefin tuna mortality and behaviour to help refine best-practice CAR techniques;
2. Deploy electronic tags on albacore tuna to quantify spatial dynamics of the species throughout the Atlantic, and model associations with key oceanographic parameters;
3. Evaluate population structure of both species through genetic analysis of sampled tissues.

Outcome

This project would fill knowledge gaps on the spatial dynamics of albacore and bluefin tuna throughout the Atlantic, and expand the ongoing assessment of impacts of catch-and-release (CAR) angling of bluefin tuna in Irish waters.

The expected outcomes from the project will be:

- Refined stock assessment advice for both species
- Optimization of catch and release (CAR) protocols for bluefin tuna angled in Irish waters to ensure minimum mortality as required by ICCAT and continuance of the fishery.
- Substantial contribution to our understanding of what changes can be expected in the migrational behaviour, growth, maturation and phenology of Albacore and Bluefin tuna stocks based on modelled climate change scenarios.

It is also expected to:

- Create strong links with the current Marine Institute Bluefin tuna research programme and albacore stock assessment.
- Provide information with respect to International stock assessments of both species carried out under the auspices of ICCAT.
- Publish at least three peer-review papers.
- Produce a PhD Thesis.
- Add significant value to the data and the fish otolith archive in the Marine Institute
- Input to the advisory process on the DAFM Climate Adaptation plan for the Seafood Sector.

Links to MI Strategy

This proposal falls principally under Strategic Focus Area 3 - Research & Innovation, that links strongly with Strategic Focus Area 2 – Forecasting Ocean & Climate Change, particularly in terms of the drivers for, and the impact of Climate Change on fish and fisheries. In turn this links to Strategic Focus Area 1 – Scientific Advice & Services, specifically in providing advice for the Seafood Climate Change Adaptation plan.

Specific Requirements

The scholar should have a primary degree in a natural or ocean science, and ideally a masters level degree in an appropriate field. The scholar should have an interest in both the biological science, current electronic monitoring technologies and in mathematical and statistical modelling. An interest in, and a knowledge of the oceans, fish and fisheries would be a great benefit.

Financial Details

Scholarships will be up to €25,000 per annum (maximum funding of €100,000 over four years). This amount comprises a maintenance award of €16,000 (Irish Research Council rate) to the student as well as payment of fees to the host higher education institution (HEI). The maximum fees payable to the HEI will be €6,000 per

annum. The scholarship award also includes a budget of up to €3,000 per annum for eligible research costs (travel & subsistence, publication costs, consumables and other costs e.g. laptop) for the sole use of the student, and are payable on a reimbursement basis direct to the host institution where the postgraduate student (scholar) is registered. There are no overheads payable on the scholarship. Publication costs are intended to cover publications on which the scholar is listed as first author and are published under Open Access.

Marine Institute Co-Supervisor(s)

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