

PhD Postgraduate Research Opportunity

Ref: P885

Project Title: Improving fishing survey indices through the use of spatiotemporal models

Funding: This Cullen Scholarship (Grant-Aid Agreement No. CS/20/007) is carried out with the support of the Marine Institute and funded under the Marine Research Programme 2014-2020 by the Irish Government.

Description:

The Marine Institute Ireland conduct many scientific trawl and acoustic surveys. Indices of abundance derived from these surveys form key components of stock assessments used to provide sustainable management advice. The importance of detailed spatial considerations in index estimation has arisen relatively recently; by accounting for spatial variation in abundance, the residual variability in spatial models is reduced and index precision enhanced. Moreover, spatial modelling of survey indices enhances understanding of the distributional dynamics of species. Spatial and spatiotemporal models also allow for integration of multiple surveys and may also be less susceptible to gaps in survey coverage. Such possibilities could prove very useful where unavoidable gaps in survey coverage occur (e.g., due to weather, technical difficulties or Covid-19). Broadly, understanding how to appropriately apply spatiotemporal models to improve indices is a key scientific question to be addressed in this Cullen PhD Scholarship.

State-of-the-art in spatiotemporal modelling of species distributions has taken a leap forward in the last five years with the development of models like VAST (Vector Autoregressive Spatio-Temporal) model, which is an advanced framework for investigating how species and community distributions change in space and time. Spatial distributions of species density can evolve over time in a fully spatiotemporal framework. Such flexibility can be an improvement on static spatial distributions. Spatial and spatiotemporal methods require more extensive investigation to understand their performance from a suite of theoretical and applied perspectives. Testing must include appraisals of how accuracy and precision of estimated indices change under varying levels of model complexity from simple non-spatial models to multivariate spatiotemporal models incorporating covariates and multiple species.

This scholarship will advance our understanding of spatiotemporal modelling of fisheries survey data via addressing:

- Influence of gaps in survey coverage.
- Influence of environmental covariates on univariate (single species) spatiotemporal models and derived indices.
- Multivariate spatiotemporal modelling for survey index standardisation (modelling multiple ages or the community assemblage).
- Spatiotemporal modelling and survey design.

Thesis chapters will be designed around these themes.

Benefits to the student

- Collaboration with a dynamic group of experts in fisheries at the MI, GMIT and networks nationally and internationally (e.g., ICES). These will ensure that the knowledge and skills acquired are highly relevant to current and future needs in advice for fisheries management.
- In-depth training in statistical modelling and inference with application to index estimation and stock assessment, which are increasingly sought-after skillsets.
- Training in high-level programming (C++, R)
- Experience of the integral connections between stakeholders, science and advice.

Requirements/Qualifications: An Honours Degree (minimum 2.2, but 2.1 or higher is desirable) in the fields of ecology or fisheries science (with demonstrated significant statistical component), statistics, mathematics or computing (with demonstrated significant ecological component) at the commencement date of the project. A Master's degree in a relevant area will be an advantage, particularly spatial modelling, survey design, population dynamics or stock assessment. Demonstrated experience in scientific programming (R, C++, other) will be an advantage as well as evidence of contributions to scientific publications.

Project Duration: 48 months

Conditions:

- €18,500 Stipend per annum.
- Postgraduate fees for EU students will be covered by the project.
- In addition, any necessary travel and material costs incurred during the project will be covered.
- The student will be based at GMIT and will also have access to facilities at GMIT and the Marine Institute headquarters in Galway.

Please Note: Candidates from outside the EU are eligible to apply but may be expected to provide evidence of sources of additional funds to cover excesses associated with Non-EU fees.

If either English or Irish is not the applicant's first language, evidence of English language proficiency is required for registration. Please refer to web link: [English Language Requirements | GMIT](#) to view the minimum English language proficiency standards for entry to GMIT

Project Start Date: August 2021

Application Closing Date: 12 noon, Friday 14th May 2021

Applicants should submit their:

- Curriculum Vitae (to include 2 referees)
- a copy of transcript of results and
- a one-page Personal Statement to: ResearchOffice@gmit.ie

Applications must be submitted to the Research Office e-mail address only. Please ensure all documents are emailed as a single Word or PDF file.

The Personal Statement should not exceed 1 page and should explain:

- How you meet the requirements of the position
- Why you would like to pursue this PhD research programme

For further information on the project please contact:

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Data Protection Statement

GMIT takes very seriously its legal obligations as set out in the General Data Protection Regulation 2016/679 (GDPR) and the Irish Data Protection Act 2018 to safeguard and protect your personal information in our possession. The personal information which you disclose to us in this form will only be used to assess your suitability; administer and register you for this scholarship. We will not keep your personal information for any longer than is necessary for those stated purposes. **For more details, please refer to GMIT's Student Privacy Statement: <http://www.gmit.ie/general/student-privacy-statement>**