PRIFYSGOL BANGOR UNIVERSITY

Molecular Ecology and Fisheries Genetics Laboratory

http://mefgl.bangor.ac.uk/

3.0 year, EU Horizon 2020-funded PhD Studentship (2018-2021)

Defining Management Units in Commercial Fish Species

Supervisors and collaborators: *Gary R Carvalho (Bangor, UK); Alex Papadopulos (Bangor, UK); Einar Nielsen (DTU-Aqua, Denmark); Jann Martinsohn (JRC, European Commission), Ernesto Jardim (JRC, European Commission)*

The *Molecular Ecology & Fisheries Genetics Laboratory* (MEFGL), School of Life Sciences, is currently advertising an exciting multi-disciplinary PhD opportunity hosted at Bangor University (http://mefgl.bangor.ac.uk/) to **commence in September 2018.** The PhD is part of a recently-funded 25-partner EU H2020 project, *PAradigm for New Dynamic Ocean Resource Assessments and exploitation (*PANDORA). The consortium brings together a team of oceanographers, biologists, economists, stock assessors, fishery advisors, industry and Regional Fisheries Management Organizations (RFMO) to create a step-change in our ability to manage and enhance the long-term benefits of European fisheries resources. The Bangor-based student will collaborate directly with PANDORA colleagues at the JRC, European Commission in Italy, and DTU-Aqua, Denmark with two main goals: 1) with existing data, assess the impact of typical mismatches between biological stocks and management units - units that are commonly defined geographically at present. This will combine meta-analyses of biological traits with population modelling; 2) generate new knowledge for improved stock assessment of new mesopelagic fisheries at two biological levels. *At the species level,* by development of DNA based *in-situ* assays using a fully portable device (Genie III), for fast and reliable field based species identification. *At the population/stock level,* by generating high-resolution assays for population identification.

The MEFGL is housed in the Environment Centre Wales Building (ECW), linking the MEFGL to the Schools of Life Sciences and Ocean Sciences and the NERC Centre for Ecology and Hydrology (CEH), which promotes collaborative opportunities. The MEFGL benefits from fully equipped molecular laboratories and High Performance Computing facilities (the HPC Wales supercomputing genomics gateway).

PhD rationale: (1) ***Biological and management units***: Many global fisheries comprise biologically significant units that do not coincide with the existing spatially resolved management framework. While studies have demonstrated the benefit of partitioning fisheries data to determine vital statistics of recruitment, growth and mortality, a key knowledge gap is an explicit demonstration using representative taxonomic and ecological fish diversity, as well as, quantification of the economic and biological "cost" of on-going strategies based on such mismatch. In brief, collated data (EC Data Collection Framework, ICES, RAM legacy database) will generate a consensus delineation of existing management units of selected species. This will highlight the costs/benefits of incorporating biological integrity into stock assessment and the impact of alternative management scenarios. The proposed focus on biological integrity highlights the role of biodiversity (species and population) within communities and associated biotic and abiotic interactions, ecosystem function and services. The findings will reinforce the evidence base for the globally strongly endorsed ecosystem-based approach to fisheries management and conservation. (2) ***New fisheries resources***: The biomass of mesopelagic fishes, estimated at 10 billion metric tons, represents a largely unexploited fisheries resource. However, biological knowledge is generally limited and most of the existing literature relates to description of genera rather than species. Accordingly, there is a need to develop systems for easy *in-situ* identification of catch composition for personnel without taxonomic expertise. Likewise, many potentially exploited species have distinct geographical distributions, representing either one large stock, several or many separate stocks. As many species and stocks are likely to be vulnerable to overexploitation, it is important to first identify the units of exploitation. That is, which harvested species represent local or global stocks? Combining such knowledge with general biological information (growth, age, diet, etc.) will inform measures of biological unit delineation.

Training: The project offers opportunities for the student to gain knowledge of, and experience in, Fisheries Science; Conservation and Management of Exploited species; Genomics; Bioinformatics; Evolutionary Biology & Population Genetics; Advanced statistical analysis and meta-analysis; Environmental Risk Assessment and Science Communication. Training and research activities will enhance leadership skills by employing cutting-edge techniques within an interdisciplinary environment and context of policy development for sustainable fisheries and conservation biology, and engagement with a network of diverse scientists from PANDORA.

Where is Bangor?

Bangor is located in North West Wales, UK, situated in an area of outstanding natural beauty between Snowdonia National Park and the sea (http://www.bangor.ac.uk/bangortv/bangorandthearea.php), providing an opportunity for an affordable and high standard of living amongst a spectacular natural environment.

Application requirements: Essential skills are a minimum 2:1 BSc (or equivalent in Life Sciences), with good quantitative/numerate skills, statistical analysis and programming, a strong enthusiasm for biodiversity and sustainability science.

Desirable skills are experience of population genetics and/or bioinformatics, with a desire integrate such data into sustainable management and conservation biology.
PLEASE NOTE THAT THE STUDENTSHIP IS RESTRICTED TO UK/EU NATIONALS.

Closing date for applications: 31 June 2018 with interviews to take place on **Tuesday 17 July 2018**. For informal enquiries, please contact Professor Gary Carvalho, g.r.carvalho@bangor.ac.uk.