

Climate change impacts on UK fisheries: A social-ecological approach

Supervisors:

Dr Steve Simpson (College of Life and Environmental Sciences, University of Exeter) – Main supervisor

Dr Kirsten Abernethy (Environment and Sustainability Institute, University of Exeter)

Dr Martin Genner (School of Biological Sciences, University of Bristol)

Prof Simon Jennings (Centre for Fisheries and Aquaculture Sciences (Cefas), Lowestoft)

Dr Jonathan Tinker (Shelf Seas and Marine Impacts, Met Office)

Hosting Institution: University of Exeter

Project description: Capture fisheries make crucial contributions to the world's wellbeing and prosperity. The global value of fisheries was estimated as over US\$90 billion per annum in 2010. Over 38 million people are fishers and around 10% of the world population are employed in, or dependent on, fish-related jobs. Fish are a vital source of protein and micronutrients, and provide 3 billion people with 20% of their animal protein intake. With the global climate changing, fisheries are also changing. Species distributions are shifting, and warmer temperatures are affecting fisheries production. This means target species and fishing activities must adapt to the opportunities and threats.

Much of the evidence of climate change effects on fisheries has come from research in the UK (e.g. Simpson et al. 2011), due to rich fisheries data and significant warming over the past 30 years, making this an ideal region for understanding implications of climate change for global food security and local fishery-dependent industries and economies. Using the established Newlyn Fleet case study (Abernethy et al. 2010), this studentship aims to understand the links between how climate change has and will affect fisheries and the impacts fishers are experiencing, through:

- Combining state-of-the-art climate models (with strong input from Project Partners at the Met Office) with long-term fisheries survey data (with supervision from CASE Project Partner at Cefas) to apply statistical and mechanistic models to explore past and predict future impacts of climate change on fish species.
- Use interviews with fishers, fishing industry representatives, fish traders, consumer groups and the public to explore: perceptions of climate change; past shifts in abundance of target species in the fishery; changes in overall composition of the catch (including rare, endangered and exotic species); and past and likely future responses of the industry to changing opportunities.
- This interdisciplinary approach will identify similarities and differences between a data-driven macroecological approach with social and economic understandings based on experiences of the fishing industry.

During Summer 2013, we drew on links established by Abernethy in Newlyn to test the willingness of fishers and the wider industry to discuss climate change and past effects on their fisheries. This pilot study reinforced strong links to the community, confirmed their interest in climate change impacts, and demonstrated the need for regional-scale analyses of ecological changes in fish communities, and a social-ecological approach that can guide the UK fishing industry to optimise the sustainability and productivity of fisheries.

Simpson SD, Jennings S, Johnson MP, Blanchard JL, Schön PJ, Sims DW, Genner MJ (2011) Continental shelf-wide response of a fish assemblage to rapid warming of the sea. *Current Biology*, 21, 1565-1570

Abernethy KE, Trebilcock P, Kebede B, Allison EH, Dulvy NK (2010) Fuelling the decline in UK fishing communities? *ICES Journal of Marine Science: Journal du Conseil*, 67, 1076-1085.

Training opportunities:

The student will join a dynamic team of fisheries ecologists and climate modellers, including two NERC Cefas-CASE students supervised by Simpson who started in 2013.

- The student will undertake programming and modelling training at Cefas, and also attend the climate-modelling course at the Met Office.
- The student will be trained in macroecological theory and analysis by Martin Genner in Bristol.
- The student will take the relevant MSc courses in social science by Kirsten Abernethy at the ESI.
- The student will receive structured training in communication, knowledge exchange and developing impact, with opportunities to practise skills at international and national levels.