

By: Principle Scientific and Conservation Officer

To: Kent & Essex Inshore Fisheries and Conservation Authority
25 November 2025

Subject: **Update on PhD project:** *"Shellfish fisheries under pressure from increasing frequency and intensity of marine heatwaves"*

Classification Unrestricted

Summary:

This paper updates Members of the on the development of the co-funded PhD project. The PhD study will investigate the water temperature tolerance and climate-related responses of key shellfish species in the Thames Estuary, providing evidence to support future sustainable fisheries management.

Recommendations:

This report is for **noting** and **commenting**:

1. Better understand the anticipated content of the PhD and timelines
2. We are currently advertising the PhD to recruit a student to start in January 2027:
<https://www.essex.ac.uk/Postgraduate/Research/Opportunities/future-shellfish-fisheries>

1. Recap of and development since August 2024

Shellfish such as cockles, clams and whelks are the cornerstone of our inshore fisheries in the Thames Estuary. It supports the livelihoods of our local fishing communities and fishery processing harbours and industries. However, rising sea temperatures (since 2011) and more frequent and prolonged marine heatwaves, as experienced since 2018 and with marked impacts on the whelk and cockle fisheries in 2022, have raised concerns with fishermen and managers about the medium to longer term outlook and viability of these fisheries. Furthermore, these environmental changes are expected to intensify in the years ahead.

This PhD project aims to better understand how key shellfish species — including cockles, whelks, and Manila clams — will respond to a warming sea. It will

investigate how rising temperatures affect their biology, behaviour, reproduction, and survival. It will also explore whether the composition of shellfish species in the Thames Estuary may shift towards different species, and what this could mean for future fisheries.

By understanding how shellfish are likely to respond to large scale environmental drivers, KEIFCA will be better equipped to support coastal fisheries and develop the adaptive tools and strategies needed to manage future challenges. We hope that by better understanding how our shellfish are likely to respond to these inevitable changes we may better identify which species, and hence their fisheries, are likely to struggle, and where do the new opportunities lie.

In earlier work that we did with University of Essex, our results showed whelks were found to be undergoing stress when water temperatures were kept above 17°C, experienced severe stress above 20°C and mortality after 22°C. This study also showed limited ability to recovery of metabolic cellular processes within the whelks that were returned to cooler waters after significant exposure. This is a species and fishery that we rightly feel needs further investigation out of concern for the long-term sustainability. There remain several unanswered questions around the impacts on their reproductive capability, and the effects of duration of exposure to elevated temperatures.

In contrast, Manila clams have successfully settled and reproduced on our Essex Coast to the point where we are now running trial fisheries and is seen as a hopeful potential alternative fishery in an area where fishers' options have dried up in the wake of significant ecological changes, primarily driven by warming waters. However, KEIFCA needs a better understanding on how the change in water temperature is likely to impact not only clams but also cockles. Clams co-occur and compete for space and food with cockles on intertidal sand banks in the Thames Estuary. It is important for us as managers of these fisheries to better understand how the odds are changes and impacting on these fisheries.

2. Research Objectives

The project will address the following core research aims:

- Assess thermal tolerance & duration of stress in commercially important shellfish species, namely.
 - Whelk
 - Cockles
 - Manila clams
- Quantify physiological, behavioural, and reproductive responses to elevated temperatures:
 - Including oxygen consumption, condition indices, reproductive and feeding effort
- Integrate observed biological data with local sea water temperature trends to forecast species shifts & identify implications for fisheries.
- Provide robust, applied evidence to inform KEIFCA's adaptive management and policy.

3. Anticipated Outputs and Benefits

The research will deliver both academic and applied outcomes, including:

- PhD thesis and peer-reviewed scientific publications
- Evidence to inform KEIFCA shellfish management strategies.
- Contribution to KEIFCA's broader understanding of environmental change
- Outreach and dialogue with local fishing communities via KEIFCA and the Fishmongers' Company

4. Downstream outcomes

We expect to get a better understanding of how shellfish will respond to these changes and stressors, which would inform downstream outcomes like adaptive tools to help manage climate-driven risks—for example:

- Real-time marine heatwave “trigger points” to protect shellfish stocks.
- Pre-spawning temperature forecasting to support cockle fishery planning.

5. Supervision Team

The student will be supported by an experienced, interdisciplinary supervisory team with academic and applied research staff:

- **Dr. Michael Steinke, Prof. Tom Cameron** (University of Essex, primary supervisor)
- **Dr. Philip Haupt** (KEIFCA, co-supervisor)
- **Dr. Will Wright, Dom Bailey** (Advisors)

6. KEIFCA Involvement

KEIFCA will play a central role in facilitating, guiding, and applying the research.

- Provision of access to:
 - Local fishers, fisheries datasets, field sites, and vessel support
 - Early on in the PhD, we will introduce the student to fishers, and fisheries in our district, to give them context and relevance of their work.
 - Have regular discussions with the KEIFCA Chief Officers, to give the student a working understanding of the importance and relevance of the management outcomes.
 - Have meeting with CEFAS to ensure student has a good understanding of species distribution responses to climate change.
- Ongoing knowledge exchange between KEIFCA staff and academic partners
- The student will be embedded within the KEIFCA team for part of the project to maximise applied impact.

7. Timeline

We expect the PhD to begin in January 2026 and follow a typical PhD structure over 3–4 years. Field work and sample collection will be carried out in close collaboration with local fishers to ensure that samples are collected at the right time of year.

We have started the recruitment phase with the hope that the PhD candidate would start in January. Failing successful recruitment on the first attempt we would re-advertise in January and start in September.

- **PhD Advertised**
<https://www.essex.ac.uk/Postgraduate/Research/Opportunities/future-shellfish-fisheries>
- **Short-listing:** November 2025
- **Interviews:** December 2025
- **Start Date:** January 2026
- **Key milestones:**
 - Year 1: Experimental setup, lab work and literature review, initial fieldwork, stakeholder engagement
 - Year 2: Field sampling continues; climate modelling initiated.
 - Year 3: Data analysis, synthesis, and reporting
 - Year 4: Thesis write-up, stakeholder engagement, knowledge exchange

Recommendations:

This report is for **noting** and **commenting**

Year	Phase	2025 H2	2026 H1	2026 H2	2027 H1	2027 H2	2028 H1	2028 H2	2029 H1	2029 H2
0-1	Student Recruitment & Start-Up	•••	•••							
1	Experimental Setup & Method Development		•••	••						
1	Literature review		•••	••						
1-2	Laboratory Work & Physiology Trials		••	•••	•••					
1	Field Sampling & Fieldwork		•	•••	•••	•				
2-3	Data Modelling & Integration with Climate				••	•••	•			
3	Data Analysis			•	••	•••	•••	•		
3-4	Drafting Publications / Thesis Chapters			•	•	••	•••	•••		
4	Final Write-Up & Thesis Submission						•	••	•••	•
4	Knowledge Exchange & Stakeholder Outreach		•		•		•	•	•••	•

Legend

- = Key activity period (heavier ••• = intensive focus)
- H1 = Jan-June; H2 = July-Dec