



# MASTS-SFC Saltire Emerging Researcher Scheme (MASTS-SERS)

## Final Report

MASTS in association with the Scottish Funding Council supported the Saltire Emerging Researcher Scheme, which represented an important and exciting opportunity for Post Graduate Researchers (PGR) and Early Career Researchers (ECR) to engage in substantive collaboration with colleagues from Europe (EA, EEA and EFTA countries).

The scheme aimed to promote mobility between Scotland and European research partners with the aim of strengthening existing, and seeding future, research relationships. Participants are expected to demonstrate the impact of their exchange through the publication of novel research work, the formation of new collaborations and project/ funding submissions, and the dissemination of their results.

As your exchange has now come to a close, we ask that you reflect on the exchanges and provide a report by filling in the form below. The reports will need to demonstrate the potential benefits of the grant for both the recipient and their collaborators. Please return this within four weeks of completing your exchanges to [masts@st-andrews.ac.uk](mailto:masts@st-andrews.ac.uk). When you do so, you are agreeing that your answers may be used to promote the activities of MASTS, including being used on the website and social media channels.

Please note that MASTS may also contact you, the participants, and/or your supervisors to gather additional post-exchange impact information. This information must be provided on request.

## Contact information

|   |  |
|---|--|
| <b>Participant name</b>                           | Nicholas Jones   |
| <b>University &amp; Department</b>                | University of St Andrews, School of Biology  |
| <b>Email address</b>                              | <a href="mailto:narj@st-andrews.ac.uk">narj@st-andrews.ac.uk</a>                         |
| <b>Host name</b>                                  | Dr Lisa Shama and Dr Helen Spence-Jones  |
| <b>University or Institution &amp; Department</b> | Alfred Wegener Institute for Polar and Marine Research;<br>Biosciences   Coastal Ecology |
| <b>Email address</b>                              | <a href="mailto:lisa.shama@awi.de">lisa.shama@awi.de</a>                                 |

## Exchange overview

|                            |  |
|----------------------------|--|
| <b>Title</b>               | Exploring the interacting effects of thermal fluctuations and habitat complexity on stickleback behavioural adaptation |
| <b>Start date</b>          | 06/03/2022   |
| <b>End date</b>            | 25/05/2022   |
| <b>Project location(s)</b> | Alfred-Wegener-Institut<br>List auf Sylt<br>25992<br>Germany   |

### Abstract (max 300 words)

Provide a brief summary of the exchange using language accessible to a non-specialist. Describe what the exchange objectives were, the activities that were carried out, and the subsequent outcomes. This may be published on the MASTS website.

This MASTS -SALTIRE exchange gave me the opportunity to travel to a world class marine research unit on the North Sea, the Alfred-Wegener-Institute (AWI), where they focus on coastal science and fisheries ecology. The primary objective of the exchange was to explore the potential consequences of more extreme temperature fluctuations in temperate marine fish species, given that more extreme temperature fluctuations are and will continue to be increasingly common with climate change fluctuations in temperature. Asking the question: is their behaviour, or growth affected by different levels of temperature fluctuations? To do this to run behavioural experiments with the marine three-spine sticklebacks - one of their main subject's species – to compliment my hosts research which focuses on exploring adaptation at the molecular level in this species. The experiments were designed to explore whether there were effects on the fishes when housed in conditions with different thermal variation, specifically exploring whether there were differences in foraging efficiency, and growth rates. We also explored the effects of different levels of physical enrichment (shelter in the form of artificial plants added to the aquaria) available to the fish and by exploring whether their growth and survival when kept in conditions with low and high levels of shelter. The experiment took advantage of their custom-built system that houses over 400 hundred fish in different thermal conditions, with either constant temperature, or with random daily fluctuations of either low (+/- 1.5) or high (+/- 2.5) degree changes in temperature per day. We conducted daily experimental trials where groups of fish were tasked with foraging for food in large arenas and explored their performance – essentially measuring how quickly they found the food across time. Growth, condition and survival were measured at intervals across six months. We are still analysing the results but hope to answer the question soon and produce a published article with the results.

### Impact (max 600 words)

Please demonstrate the impact of your exchange from your perspective, and that of your exchange partner. Describe what the wider benefits of the exchange were to you as participant, your own and host institutions, and the wider community.

The exchange was success in several ways. Personally, it was a major highlight affording me the opportunity to work in a very well-equipped laboratory in a very different research institute to the ones I had experienced during my PhD. The host institute had very little prior experience in the field of animal behaviour, and our collaborative experiment introduced new approaches to supplement their work and afforded both me and the host researchers different and stimulating perspectives on the overarching research questions. Although we encountered difficulties that impacted the length of time we could run the

experiment and schedule (due to Covid and travel changes), a major positive was the ability to attract an intern who joined us and gained a lot of hands on experience working with fish, and conducting behavioural experiments. This also afforded me and my host institute based post-doc project partner the chance to gain experience in training, mentoring and working with an assistant.

### **Outputs (max 300 words)**

Has this exchange resulted in clear outputs, such as the generation of a proposal, research results, or publication? Please provide brief details here. Do any of these outputs have relevance to larger programmes such as the UN SDGs, Blue Economy Action Plan etc?<sup>1</sup>

We completed two experiments and have data which will eventually be published as academic articles. At least one article will directly contribute to the scientific understanding of how to restore and adapt ecosystems and thus may contribute to the SDG target 14. We specifically tested whether certain levels of habitat complexity can positively impact behavioural and physiological performance in fishness living in fluctuating thermal regimes, our results may help us to understand the potential effectiveness of certain adaptation strategies for reducing the impacts of climate change and promote specific habitat restoration measures.

### **The Future (max 300 words)**

How do you plan to ensure a sustainable collaboration in the longer-term and maximise opportunities and impact in the future? How will you carry forward the benefits now the exchange has been completed? Please outline five concrete plans for future collaboration as a result of your exchange.

We have developed a plan for a follow up project exploring the same research question, but with additional temperature conditions. To 1) to explore the metabolic implications of climate change and thermal fluctuation (Dr Felix Mark, Dr Uwe John; AWI); 2) a mesocosm project to investigate the impacts of community effects on response to thermal fluctuation (i.e. biotic factors beyond habitat complexity) with Dr Lukaz Meyick, AWI; 3) work to include the effects of thermal fluctuations on mate choice and nest building success (Dr Mike Webster and Karina Vanadzina, St Andrews); 4) work with Edinburgh university (Dr André Phillips) to extend the experiments to include freshwater ecotypes, and 5) a potential further collaboration within this project on whether habitat complexity has effects on transgenerational non-genetic inheritance of factors affecting temperature response (Dr Helen Spence-Jones, AWI). We have also made plans to collaborate on a joint project on a separate fish system with a third partner institute. This, we hope, will explore a wider range of potential non-lethal effects of a combination of thermal and toxin stress on fish biology.

### **Any further comments (max 500 words)**

Please use this space to provide any additional comments. These may include, but are not limited to; what you would do differently if you could take the exchange again; what contingency measures you had to use (if any); details of any unexpected benefits or problems; any significant variations in costs;

There were no significant changes in costs, or experiments conducted, but there were significant changes in the schedule as we worked around travel restrictions and personal isolation. We had to split the main

<sup>1</sup> All successful applicants will be expected to represent, promote and formally acknowledge the sponsors (MASTS, SFC & Scottish Government) during the course of their project and in any subsequent related outputs. All research outputs and any material used publicly must carry the funders' logos. The following acknowledgement should be used in all publications resulting from this funding. ["This work received funding from the Scottish Funding Council Saltire Emerging Researcher Scheme and the MASTS pooling initiative (The Marine Alliance for Science and Technology for Scotland) and their support is gratefully acknowledged. MASTS is funded by the Scottish Funding Council (grant reference HR09011) and contributing institutions"]

experiment into two different batches, separated by a few weeks. We also had to delay my physical visit, but as per our contingency plans we conducted online meetings and the host scientist conducted pilot trials and setup for me. We also were able to get a paid intern to help with the experimental trials while I was off site. He conducted one third of experimental trials and ran his own complimentary side project which will tie into our experiment and may contribute to ne of our research publications.

## Final expense report

| Item Number                  | Description   | Cost per Unit                                 | Number of Units | Total Amount (£)       |
|------------------------------|---|---|-----------------|------------------------|
| 1                            | Salary, Research Fellow grade 6.33                              | £110.42 per day, (0.5 FTE of £220 daily rate) | 40 days         | £4 416.80              |
| 2                            | Accomodation, (institute subsidised.)                           | Euro 27.8 per day Plus (€21 tourist tax)      | 2 weeks         | Euro 411.00 ( £366.00) |
| 3                            | Flight from Hamburg   | £136.90                                       | 1               | £136.90                |
| 4                            | Subistence  | £ 25 per day                                  | 2 weeks         | £350.00                |
| 5                            | Train Berlin to Sylt ( Host institute)                          | 1   | Euro 82.90      | £72.83                 |
| 6                            | Train Sylt ( Host institute) to Hamburg                         | 1   | Euro 40.90      | £35.93                 |
| 7                            | Data storage ( External hard drive) to backup experimental data | 1   | £141.09         | £141.09                |
| Add more rows if needed      |   |   |                 |                        |
| <b>Total</b>                 |   |   |                 |                        |
|                              |   |   |                 | <b>5519.55</b>         |
| <b>In-kind contributions</b> |   |   |                 |                        |
| 1                            | Bench/ lab fees   | Waived  |                 |                        |
| 2                            | Cosumbales (fish food?)   | Frozen mini bloodworms @ £1.99 per pack       | 42 packs        | £83.58                 |
| 3                            | Supervision and training time by host                           | £350.00 per day                               | 4 days          | £1 400.00              |
| 4                            | Technician time   | £87.22 per day                                | 8 days          | £ 697.76               |
| 5                            | Host post doc time  | £220 per day rate                             | 10 days         | £2 200.00              |
| 6                            | Pais intern assistance  | £75 a day                                     | 4 weeks         | £1 500                 |

|  |  |  |  |                 |
|--|--|--|--|-----------------|
| <b>In-cash contributions</b>   |  |  |  |                 |
|  |  |  |  |                 |
| <b>Grand Total</b><br>(Total requested from scheme + In-kind + Cash) |  |  |  | <b>11400.89</b> |