

## Catie Gutmann Roberts from the University of Plymouth and a new council member, outlines recent research activities



Overall my research aims to determine an evidence base for aquatic conservation methods through predominantly non-invasive research techniques. Recently I have been quantifying the fish recruitment impacts from restoration methods such as gravel cleaning, increasing riparian cover, and barrier removal. To understand the risk to eggs and larvae from land use in the catchment, I carried out a catchment wide mapping study across two catchments in Devon, UK; the Exe and the Teign. I reviewed the existing evidence, such as, citizen science redd records, Rivers Trust electric fishing records and data on the land cover (CEH Land Cover

2020 series) and the relating scores from SciMap which predicts sediment risk. This allowed a comparison across adjacent catchments and within catchment comparison for sediment risk and how these are spatially related to redd creation and parr survival. For the Exe catchment redd records were only found within low sediment risk sub catchments but in the Teign there were redd records in areas of medium risk. Even this desk-based approach could provide evidence for management strategies but it also led to a further research question and validation of this tool.

The next steps involved a field sampling campaign across 26

sites within the Exe catchment to determine the surface and subsurface sediment quality and to determine the alignment with the risk maps. We found localised variation within the sub catchment level for the proportion of the riverbed made up of fine sediment. With existing formulas that estimate salmon egg and embryo survival based on the sand and silt fractions of the fines we could then estimate the survival of salmon across the catchment which varied from 4 to 71%. This information can help with the spatial allocation of restoration efforts. Locally, gravel jetting is being employed as a method to reduce the amount of fines within the river bed by ➤

using high pressure water jetting to suspend the fine sediment fraction and move it downstream. The sites where this has happened, together with our characterised sites, enabled a before and after comparison for the management technique. We will now determine if the amounts of fines have been significantly reduced and what the estimated survival increase would be for salmon eggs and embryos at each site. Previous research shows that gravel jetting is only effective on a very localised scale and over a temporally short time period. Therefore alongside checking the effectiveness of this strategy we hope to continue working in this catchment to develop more long term ways to reduce the sources of sediment entering the rivers. We plan to collect data from future Landscape Recover projects and understand how the policy changes from the Environment Land Management Schemes could be best used to reduce the excess sediment from crossing the terrestrial to freshwater boundary.

The environmental and abiotic conditions required for successful salmon egg to emergence survival is relatively well known, with regards to the egg pore structure and the size of sediment particles that may block the pores and the levels of oxygen demand. This information gives the ability to



estimate the survival rates across areas that have the appropriate environmental conditions characterised without the need to disturb or physically measure survival in situ. It also allows the prediction of salmon survival within these same catchments under future climate predictions where both reduced flows and increasing temperatures will impact on sedimentation and oxygen availability. There are many species though where the relationship between survivability and environmental conditions is not well established and this is a barrier to doing large scale evidence-based restoration work, as there are no environmental thresholds to use as the conservation objective. Such a species, is the European barbel, *Barbus barbus*, which is native to the East of England and has been widely introduced across the UK for angling opportunities due to its large body size as an adult and its strong fighting abilities when caught. During my PhD I characterised the redds and spawning gravels that barbel use, showing that when salmon and barbel are of a similar size they can create redds of similar dimensions. We also determined that barbel have a much higher tolerance to a range of sand grain proportions than salmon do and we established an equation to calculate barbel eggs survival under a range of conditions. What was missing in the literature is the impact of the finer particles of silt on barbel and I have carried out in situ experiments this year to try to understand the proportions of silt that would lead to unsuccessful recruitment in the wild. We also used scanning electron microscopy to look at the egg surface physiology to compare this to salmon eggs and see if this could explain their differences in tolerance. Whilst barbel may be non-native in some UK streams there is little evidence documenting that they

are currently having any negative impacts on local species and they could lead to river restoration actions further downstream, where salmon spawning is not so common.

Whilst there are UK wide databases which tell us about the environmental conditions (e.g. CEH land cover which can be used to estimate sediment risks), and there are new spatial databases telling us about the state of salmon (e.g. the NASCO rivers database) there is still a paucity of information on distribution of some of the range expanding species, such as, European barbel. The current National Biodiversity Network gateway maps suggest there are no barbel in the Welsh Dee although there is video footage online from photographers such as Jack Perks, which clearly show their presence. There are also catch reports from the Exe catchment of barbel in angler's forums, suggesting they are continuing to spread into west-flowing rivers in the UK. Whilst the impacts of barbel have not proved to be damaging in the UK they have had detrimental impacts at their Southern invasion in Italy where they are hybridising with local endemic barbel species and eating the same food resources. There are other UK non-native species which have current management action plans to reduce their abundance such as the Zander (*Sander lucioperca*), for which the distribution is also not well established on national databases. Therefore a further strand of my research focusses on whether anglers, as citizen scientists can help inform the state of knowledge on the distribution and population dynamics of non-native fish in the UK.

# Editorial

The FSBI is now 55 years old. The American Fisheries Society is 153 years old. It has often struck me as strange that the UK was so slow to set up a society dealing with fish biology whilst the much younger society in the US founded a fisheries society so much earlier. The answer I think lies in the history of the Marine Biological Association. This was founded in 1884 with the specific aim of gathering information on the biology of commercial fish species. At that time, some of the basic facts about fish life histories were still obscure and this was hampering any efforts that might be thought of to explore the effects of fishing on fish stocks. Frank Buckland in a report he wrote with his fellow Inspector of Sea Fisheries, Spencer Walpole in 1879 on the Sea Fisheries of England and Wales commented that “The greatest ignorance prevails about the habits of sea fish”. Buckland writes further in an appendix to the main report that: “That there are fish enough in the open sea to hold their own against any ravages that man may make upon them is, I think, evident. What is really wanted in order to ensure for the future an abundant supply of food is an accurate knowledge of the habits, migrations, feeding

grounds, spawning places, and modes of spawning of fish, and of the influence which soil and climate, and above all, temperature have upon them”.

In Norway, some advances were made in the last quarter of the 19th Century by scientists such as G. O. Sars who worked out the migration of adult cod from the Barents Sea down to the sea area between the Lofoten Islands and the Norwegian mainland where spawning took place. The eggs and larvae were then carried back to the Barents Sea in the North Atlantic drift. This process defined a unit stock which has become such an important concept for the management of fish.

Back in the UK a meeting at the Royal Society in 1884, chaired by Thomas Huxley, agreed to the foundation of the MBA to fill the gap in fish biology so eloquently described by Buckland. Plymouth was chosen as the site for the foundation of a laboratory and this opened in 1888. The Association also opened a subsidiary laboratory at Lowestoft to allow easier access for biologists (or naturalists as they were then called) working on fish in the North Sea. This was eventually taken over by the government and became the Fisheries Laboratory

which is now renamed as the Centre for Environment Fisheries and Aquaculture Science or CEFAS. As time passed the MBA’s role diverged and it now represents marine biology in general. This history perhaps explains why no society dedicated to fish biology was set up so much later than its equivalent in the USA.

The people founding the FSBI were mostly interested in the biology and ecology of freshwater fish. Jack Jones was primarily a salmon biologist but the co-founder, Peter Tomblason was not even a biologist but an angling journalist. As time has passed, the FSBI has broadened its scope covering now, not only the biology of fish but also aspects of their exploitation. This change has been discussed many times over the years and at one time Peter Miller proposed that the society should change its name to the Society for Fish Biology, which was probably a more accurate description of its activities at the time. With the broadening of the scope in the *Journal of Fish Biology* the title of the Society is now more accurate.

[Paul J B Hart](#)  
[Leicester, November 2022](#)  
[Next deadline: 1st February 2023](#)



Frank Buckland



Looking east from the Lofoten Islands towards the Norwegian mainland

# Editor in Chief view from the pages:

The *Journal of Fish Biology* is the window of the FSBI to the world, and as such the editorial board carry a weight of responsibility on behalf of the FSBI. The Journal also generates almost all of the revenue that enables our society to undertake all the excellent activities that it promotes. I myself was an early career beneficiary of the generosity of the FSBI in supporting my own conference attendance at a time when I had no access to external funding. Thus the work of the editorial board is of paramount



importance to the FSBI and the next generation of fish biologists and fisheries scientists. This leads me nicely to acknowledge the work of Prof Nick Graham (senior editor, at left) who is stepping down from the board at the end of December 2022 due to the burden of current commitments. Nick was himself an FSBI PhD student and is now a Royal Society Research Professor at Lancaster University. If ever the FSBI wanted evidence of impact it is embodied in Nick and all the ECRs that he influenced during his career. As we bid 'farewell and thank you' to current colleagues, it gives me great pleasure to announce more recent appointments, notably Patricia Rincon Diaz (at right) who was the first winner of the 'Huntingford medal' – what better way to acknowledge success and contribute to the FSBI. We also welcome Hannele Honkanen, Rui Vieira and Mariangeles Arce to the board. Finally, I want to note how much we rely on the good will of referees. Like many journals we are finding it increasingly difficult to secure good quality

reviews. A good quality review is one that helps the editor make an informed decision on whether to reject, revise or accept a paper. Comments such as 'this paper is excellent, publish as is', might be decisive but provide no helpful information. I would encourage all our colleagues to think about the review you might like to receive for your own paper and act accordingly. The entire publishing framework depends on peer review. Let's make it exemplary for the *Journal of Fish Biology*.



## Symposium held to honour the career of Tony Pitcher



Photo: Mimi Lam

I would guess that during their careers a significant number of the Society's members will have come across Tony Pitcher, either in person or when submitting to one of the journals he founded and edited. Through his research, books and journals he must have interacted with more fish biologists than most. On 21st October a half-day session was organised at the Institute for Fisheries and Oceans at the University of British Columbia, Vancouver, Canada to celebrate Tony's career. He moved

to Vancouver in 1993 when he was appointed as Director of the newly formed Fisheries Centre, the predecessor of the present institute. Before that Tony had academic positions at Imperial College, London, Bangor (then part of the University of Wales) and Ulster University, Coleraine, Northern Ireland.

The symposium on 21st October gathered together former colleagues, collaborators and past PhD students to celebrate Tony's career, and he was also

in attendance. Some of the speakers, such as Beth Fulton and myself, spoke on Zoom, but most presented live including Daniel Pauly, Cameron Ainsworth, and Divya Varki (the last two past PhD students supervised by Tony).

As many will know, Tony founded the journal *Reviews in Fish Biology and Fisheries* and subsequently *Fish and Fisheries*. He founded and edited for many years the Fish and Fisheries book series, which still exists but is now published by Springer. Much of this work was done in collaboration with Nigel Balmforth, who was a commissioning editor, first at Chapman and

Hall, then Blackwells, and Chuck Hollingworth, a Canadian biologist who lived in Bangor and was a first-rate copy editor. In addition to founding journals and book series, Tony co-wrote a textbook on fisheries ecology and edited a range of books dealing with diverse aspects of fish biology and fisheries science.

On the research side of his work, Tony had two careers, the first focusing on the function of group behaviour in fish and the second, which began when he moved to Imperial College, researching fisheries with the aim to better manage exploited ecosystems. The work on fish

social behaviour and schooling was done in collaboration with Anne Magurran, Ian Winfield, Clem Wardle and Brian Partridge (now an anaesthetist in San Diego, USA). His collaborators in fisheries management are too numerous to list.

Tony was a Council member of the FSBI in the 1980s, he organised one of the Society's annual symposia on fish behaviour and was awarded the Beverton Medal in 2003. I am sure that the members of the FSBI will want to wish Tony a happy retirement.

[Paul J B Hart](#)

## New Inside the FSBI video – *Journal of Fish Biology* Editor-in-Chief, Prof. Michel Kaiser

The *Journal of Fish Biology* is the FSBI's official journal, published by Wiley-Blackwell, and provides the Society with a large proportion of its revenue. Established in 1969, it is now a leading international, peer-reviewed journal that addresses all aspects of the biology of fish, their exploitation and their importance to human society. Recognised as

among the 100 most influential journals in Biology and Medicine, the journal encompasses all aquatic ecosystems, biology, ecology, conservation, behaviour, taxonomy, genetics, aquaculture, fisheries, social-ecological systems and palaeoecology of fish.

Prof. Michel Kaiser is the current Editor-in-Chief, and in this Inside the FSBI video, he tells us

about some of the changes the journal has seen over the last three years. These positive changes include better representation in the Editorial Board, broadening scope, editorials, social media coverage and free to view publications. Learn more about the Society's journal, [here!](#)



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# Notices

## FSBI 2023 Annual Symposium Fish habitat ecology in a changing climate

24th-28th July 2023, University of Essex



The 2023 Symposium, co-convened by the University of Essex and the Centre for Environment, Fisheries and Aquaculture Science, will present the latest science on fish habitat ecology, exploring how fish interact with their environment and how climate change and other stressors impact their behaviour, physiology, diet, and health.

The conference will bring together scientists from a range of disciplines to explore ways of integrating our research and strengthening relationships with stakeholders and policymakers to improve the effectiveness of management and conservation.

- ✓ A broad range of excellent topics that cover all areas of our member's research
- ✓ An inclusive and international symposium great for early career and senior researchers alike!

**We look forward to seeing you in-person or online next year at the University of Essex!**

### Topics to be included are:

#### **Social-ecological connectivity in fish research**

How does climate change and anthropogenic activities alter fish movements and connectivity patterns? And how can we build human social connectivity and strengthen communication between academia, stakeholders, managers and policymakers to better support fish conservation and approaches such as natural capital and nature based solutions?

#### **Understanding and predicting future fish distributions & biogeography**

Can we predict how fish distributions and biomass will respond to different global change scenarios? What data, experiments and tools do we need to make more accurate predictions (e.g. metabolic rate, thermal limits)?

#### **The role of fish in food webs**

What is the interplay between fish growth, movement and phenology and the structure and productivity of the wider food web? When do fish play key roles in governing food web dynamics (bottom up vs top-down control)?

#### **Protecting and restoring critical habitats across ecozones and life stages**

How can we better monitor, restore and protect the critical habitats supporting fish stocks across their entire life cycle, particularly when they cross ecological or management boundaries? And how does (or could) this information inform ecosystem management and spatial planning?

#### **One health**

How do stressors such as marine heatwaves, emerging contaminants, parasites and hypoxia impact fish behaviour and health (e.g. physiology, growth, fitness), and how does this impact global fish production and human health/wellbeing?

See the FSBI website for the submission of abstracts which must be in by 17:00 GMT on February 28th, 2023.

# FSBI Training Grants

Training is essential for all stages of career development and increasingly the rapid development of technologies particularly in analytical methods make “keeping up” essential for researchers and practitioners, especially in the early years. The FSBI offers training grants of up to £1000/person awarded to its members, and soon also to all

Institute of Fisheries Management members, against criteria set out on the FSBI website, where you will easily find the application forms. There are three calls a year and next one concludes on 20th January 2023. We welcome applications; so why not take the opportunity, submit the form and a supporting reference letter online and get on that course that could

change your life!

If you have queries about the application please contact Zushna Ahmed (zushna.ahmed@rsb.org.uk), the membership Officer of Royal Society of Biology who handles FSBI’s member-related business, or Dr Nigel Milner (n.milner@apemltd.co.uk), chair of the Training Grants Committee.



Henningsvær, Lofoten, Norway with fishing vessels used to exploit the spring spawning cod

## Information Desk

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