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All About The Bass 2024 Symposium Report: Summary of findings and recommendations

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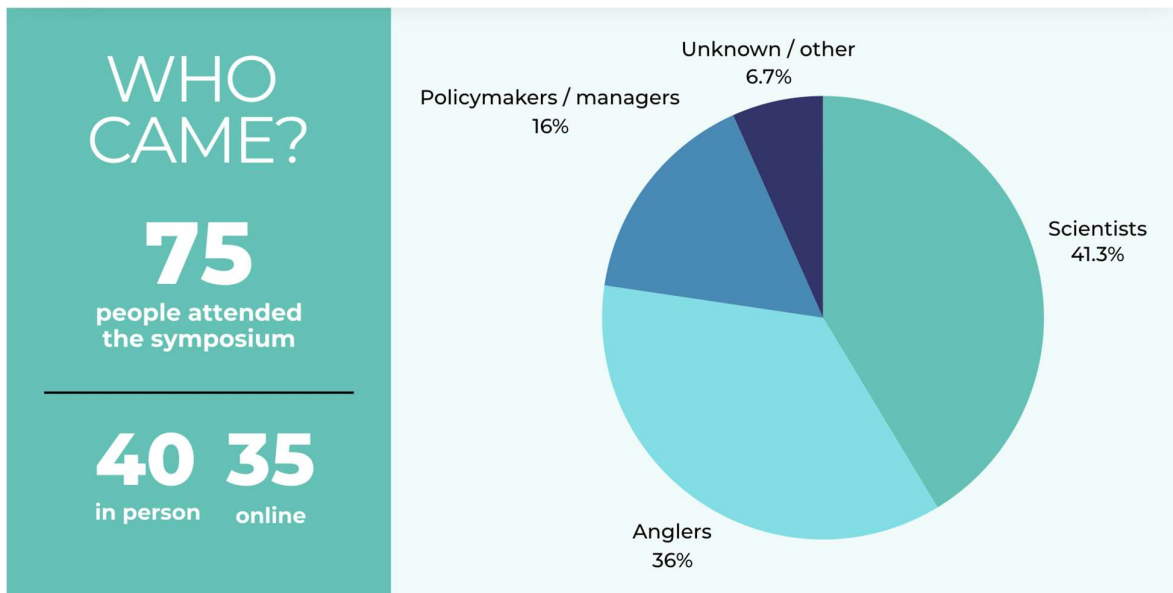
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1. EXECUTIVE SUMMARY

On 8th July 2024, the School of Life Sciences partnered with the BASS Sea Anglers' Sportfishing Society, the Centre for the Environment, Fisheries and Aquaculture Science (Cefas) and the Angling Trust to hold the first *All About The Bass* one-day symposium. The event brought together over 70 anglers, scientists and policymakers – each with diverse stories, backgrounds and expertise – but who all share a common interest in bass science and management.

The symposium had two main objectives. First, to share novel and emerging results from the latest bass research in the UK, mainland Europe and Ireland, including early results from the University of Essex's *Supper4Science* Fisheries Industry Science Partnership (FISP) project. The second objective was to hold workshops to discuss how scientists, anglers and policymakers could learn from each other and work together to improve the evidence base supporting bass conservation and management.

This symposium focused on bass biology, ecology & management, and associated data gaps. But we recognise that there is crossover and need for additional research into the social-economic side of both recreational and commercial bass fisheries. This should be part of or the focus of future symposia.



During the day, anglers shared their 'catch stories' (Section 3.3) - demonstrating how this traditional knowledge increases our understanding of bass distribution, movements, juvenile habitats and conservation needs. Many anglers are enthusiastic and are already engaged in science, or ready to. However, there are barriers to making this happen more widely and expanding monitoring and data collection into more areas. These barriers, which include trust, motivation, accessibility, awareness and resources, are detailed in the tables in Section 4.2.

Encouragingly, the workshops also showed that these barriers are not insurmountable. Anglers, scientists and policymakers discussed ways to overcome them and offered practical solutions to enable more collaborative and coordinated ways of working that could create better conditions for research and decision-making. These solutions can also be found in Section 4.2. Based on these, we have recommended tangible ways of making bass research more inclusive, accessible and motivating. Undoubtedly, these will take time and resources to implement but where possible should be integrated into research and management practices and be used to monitor progress at future bass events.

One further outcome of the symposium was the development of a website called the [Bass Information Hub](#) (Section 4.4), which brings together key information about bass, available datasets, and research opportunities that anglers and the general public can get involved with. This was a common request made by attendees and scientists, with an underlying goal being to make it easier for people to share information, collaborate and learn from each other. We hope the hub is a useful resource and we would love to hear your thoughts on it and this report.

Feedback from symposium attendees



Take home messages

- Anglers are enthusiastic and ready to engage in science.
- There is a lot of exciting research happening, but we need more centralised and coordinated datasets to maximise these opportunities.
- We need clearer frameworks and mechanisms for co-produced science.
- All stakeholders should be included from the start of research to build trust and relationships.
- Anglers want to see results and outputs from research they're involved in.
- Traditional knowledge and anglers' stories are invaluable data sources.
- Regular collaborative forums are needed that include all stakeholders (including both recreational and commercial fishers).
- Future symposia should include or focus on the socio-economic value and impacts of recreational and commercial bass fishing.

View the talk schedule, talks and presentation slides here:

<https://tinyurl.com/BassEvent> | <https://tinyurl.com/BassConfVideos> | <https://tinyurl.com/BassConfSlides>

2. BASS LIFE – AN ICONIC SPECIES

2.1 Overview of bass biology and ecology

2.1.1 Bass distribution and life cycle

The European sea bass (*Dicentrarchus labrax*) is an iconic and fascinating species, highly valued by commercial and recreational fisheries that contribute culturally, socially and economically to coastal communities. They also represent an important aquaculture species in mainland Europe, particularly in the Mediterranean Sea (López *et al.*, 2015). Sea bass is a highly mobile species which is distributed widely across the northeast Atlantic and the Mediterranean (Goossens *et al.*, 2024). They are relatively slow growing and late maturing fish that feature a complex life cycle that includes both inshore and offshore habitats (see image below). Adult bass can grow up to about 9kg (Hubbard, 2022) – once mature, they can reproduce for 20 years, with the oldest bass ever recorded having reached 28 years old (ICES, 2013).

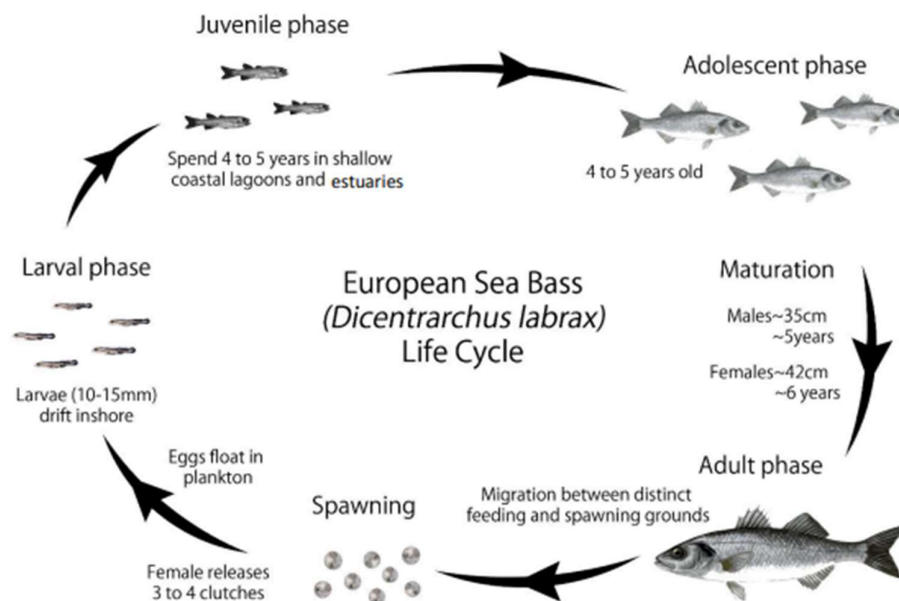


Image: The sea bass life cycle, reproduced from Carroll (2014)

2.1.2 Migration and spawning

Adult bass can be highly migratory, swimming hundreds of miles within a single year, with many individuals returning to the same feeding and spawning areas, a concept known as philopatry or site fidelity (Pawson *et al.* 2008). Falling temperatures in late autumn and winter trigger annual spawning migrations, with bass around the UK migrating south, aggregating in large pre-spawning and spawning shoals in the English Channel. The largest aggregations occur in the western English Channel where winter temperatures consistently exceed the 9°C needed for successful

spawning (Pawson and Pickett, 2005). However, there is growing evidence for spawning also occurring in the southern North Sea as sea temperatures rise (Wright *et al.* 2024). After spawning, the eggs and larvae drift in the currents before settling in estuaries and shallow embayments where the juveniles remain for up to six years (typically 2-3 in Portugal and 4-6 in the UK), gradually moving into deeper areas before reaching maturity and joining offshore feeding grounds.

2.1.3 Resilience and threats

Over the last millennia, bass have evolved an array of strategies to cope with extreme events and changing environmental conditions (Ladle, 2024). Populations have, however, exhibited rapid declines in abundance in recent decades, thought to be driven by poor recruitment (low juvenile survival) and high fishing mortality (López *et al.*, 2015). Year-to-year survival and growth, particularly for early life stages, are naturally highly variable, affected by factors such as water temperature and circulation patterns, storms, food supply, habitat availability, disease, pollution and predation. However, many of these factors are also influenced by human activities and human caused climate change. Furthermore, the majority of wetland, saltmarsh and biogenic reef habitats historically used by juvenile bass for foraging and refuge have been lost or degraded over the last 150 years due to human activities relating to land-use change, industrialisation and urbanisation (Lotze *et al.* 2006).

2.2 Overview of bass management in the UK

The Fisheries Act 2020 commits the UK to developing Fisheries Management Plans (FMPs) to support sustainable fisheries management. FMPs set out policies and measures to manage fishing activity to restore and/or maintain fish stocks to sustainable levels, whilst supporting a thriving fishing industry and a healthy marine environment (Defra, 2022).

As outlined in the Bass FMP (Defra, 2023), the steep decline in the size of the Northern stock from 2010 to 2018 resulted in emergency measures being implemented in 2015, with the UK and EU implementing a joint management approach that is amended annually.

Current measures for the Northern Stock include:

- a catch limit for hooks and lines, gill nets and other gears for commercial fishers
- a minimum conservation reference size of 42cm
- a February and March closed season for both commercial and recreational fishers
- a recreational bag limit of 2 fish per day

Since these measures were introduced, there has been an increase in spawning stock biomass – although recruitment levels remain low (Defra, 2023).

3. WHAT WE LEARNED AT THE SYMPOSIUM

The morning of the symposium was dedicated to showcasing the latest in bass science, with fifteen talks from scientists, policy makers, NGOs and anglers on topics encompassing all life stages and habitats. The presentations were separated into three broad themes that are covered in the following sections:

1. *Bass biology and ecology: what we learned from the scientists*
2. *Bass fisheries management: insights from scientists and policymakers*
3. *Catch stories: what we learned from the anglers*

3.1 Bass biology and ecology: what we learned from the scientists

3.1.1 Juvenile abundance, condition and survival

As for many marine fishes, juvenile survival during the first year is critical for driving bass population size, with ~99% of every cohort lost during their first year of life. As such, even marginal increases in survival can have big effects on cohort strength. Dr Mike Ladle showed how monitoring the size distribution of a given population allows you to ‘track’ a strong year class as it ‘grows up’ each year. Indeed, a number of presentations focused on the factors driving juvenile abundance (Martinho, 2024; Hyder, 2024, citing Watson *et al.*, 2024) and the importance of different nursery habitats for supporting their growth and survival (Colclough, 2024). Others highlighted new tools to use for monitoring, such as condition indices that may help to assess nursery habitat quality and predict survival rates (Turnbull, 2024) and natural tags in otolith (earstone) and eye lenses to track origin and thus assess estuary contribution rates to the adult stock (Sturrock, 2024). The hope is that these tools will help us to target restoration and protection measures in nearshore environments better, ideally with the support of juvenile (e.g. Cornwall Bass Investigations Group) and adult (e.g. *Supper4Science*; Freeman 2024) sampling programmes that involve both anglers and public participation. However, as emphasized by Martinho’s datasets, many mortality drivers are beyond our control, with temperature, large-scale climatic indices (e.g. North Atlantic Oscillation) and marine regime shifts exhibiting the largest impact on juvenile abundance in the Mondego estuary in Portugal, likely due to associated effects on growth, food supply and overwintering conditions (Martinho, 2024).

3.1.2 Adult and subadult movements

Multiple talks focused on the movement patterns of adult (Wuillez, 2024; Hyder, 2024, citing Wright *et al.* 2024; Tanner, 2024, citing Almeida *et al.* 2024) and subadult (Stamp, 2024) sea bass. All of these highlighted the existence of multiple migratory forms within a given stock, with typically some individuals remaining relatively local and others undertaking extremely long-distance movements. Of particular interest for fisheries management and stock delineation, the data storage tag (DST) data from IFREMER showed some adults moving frequently between the Northern stock and the

Bay of Biscay (Wouillez, 2024). Stamp (2024) used acoustic telemetry to track subadult bass and demonstrated how many remain in their nursery estuary for multiple years, showing high levels of site attachment. However, his data also showed that even these resident fish often move beyond the current extent of the existing Bass Nursery Area (BNA), suggesting that - for some - expansion of the local BNA may be beneficial. The presentation by Tanner (2024) even made us question our basic understanding of bass biology, where foraging excursions of subadult and adult bass into freshwater have been documented, but the expectation is that they are relatively infrequent and brief in duration. Although the environmental cues triggering freshwater incursions remain to be elucidated, Tanner (2024; citing Almeida *et al.* 2024) showed that large adult bass can move >150km upstream in the Tagus Estuary in Portugal and might spend up to multiple months in fully freshwater. These findings were obtained by a combination of angler surveys and tagging data, and have formed an ongoing “*FRESH*seaBASS” study to which all anglers are invited to participate and to share any freshwater catch data via this form: <https://forms.gle/q3ibQWKxjHopEBGt9> .

3.1.3 Spawn timing and larval dispersal

The general assumption is that bass spawning around the UK is focused in the western English Channel and peaks during February and March each year (Pickett and Pawson, 1994). However, this assumption has been questioned by a number of recent studies. In terms of spawn timing, Dawson (2024; citing Dawson *et al.* 2024) and McCarthy (2024; citing Lincoln *et al.* 2024) counted otolith (ear stone; see image below) daily growth rings in juvenile sea bass and showed that most individuals had been spawned in April and May, i.e. 1-2 months later than the February to March fisheries’ closure period. This was further supported by the presence of gravid females in market-sampled bass collected in April and May (Bradley *et al.* 2022). In terms of spawning location, McCarthy (2024; citing Lincoln *et al.* 2024) and Hyder (2024; citing Wright *et al.* 2024) used larval transport modelling and data storage tagged adults, respectively, to show potential new spawning areas in the Irish and North Seas.

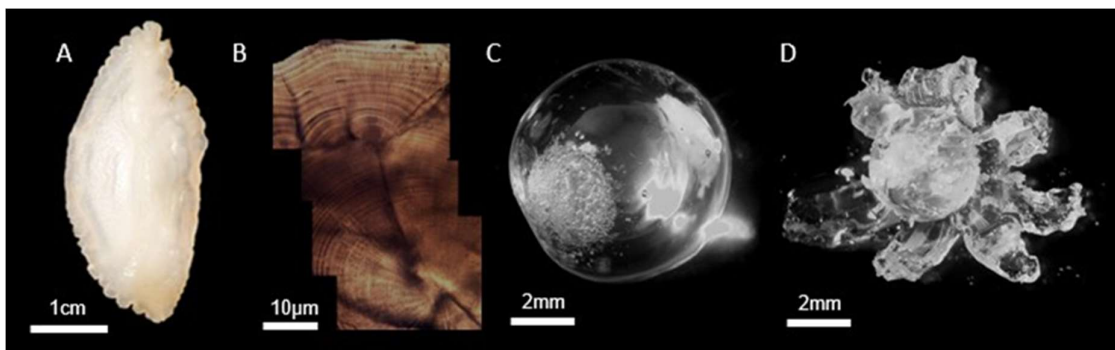


Image: Whole (A) and sectioned (B) otolith, and whole (C) and peeled (D) eye lens used to estimate bass age, growth and habitat use (based on changes in their chemistry)

3.2 Bass fisheries management: insights from scientists and policymakers

The economic benefits of bass fisheries, and the importance of bringing both commercial and recreational fishers to the table, was emphasised by both Hyder (2024) and Rudd (2024). Indeed, even with a modest number of bass retained per angler, the high numbers of anglers around the UK (estimated at about 700,000 per year, Hyder *et al.* 2024) mean that the cumulative fishing mortality could be significant.

While progress is being made to create a robust evidence base from which to support sea bass management in the UK, the bass FMP identified a number of evidence gaps which may need to be filled to achieve its goals (Defra, 2023). During the symposium, St John Glew (2024) centred on gaps that are specific to bass biology and ecology, providing a basis for the afternoon workshops to discuss the potential that new research programmes and scientist-angler collaborations could help to fill these gaps.

Specific evidence gaps relating to bass biology and ecology published by Defra (2024) included the need to:

- Understand spawning timing in different regions
- Understand environmental factors that influence recruitment success
- Understand the extent to which adults return to specific spawning areas
- Understand larval dispersal patterns
- Understand the relative importance of different nursery areas
- Quantify benefits and limitations of size-based management
- Understand the impacts of management approaches on recruitment success and biomass
- Improve understanding of stock structure

3.3 Catch stories: what we learned from the anglers

Angler knowledge has been shown to be extremely valuable for understanding fish ecology and changes in marine environments (Shephard *et al.*, 2021). At the symposium this was demonstrated by Ladle (2024) who shared an angler's view of changes to bass populations witnessed over the years. Many speakers highlighted how important the angling community can also be for tissue sampling (e.g. *Supper4Science* - Freeman, 2024, scale collections - Wögerbauer, 2024) and data collection (Ladle, 2024, Hunt, 2024, Hyder, 2024, Wögerbauer, 2024, Rudd, 2024). In particular, Inland Fisheries Ireland (IFI) have an extremely active angling citizen science programme, in part due to the closure of the commercial fishery, with anglers now contributing to scale collections, tagging bass, and reporting their catches via the [IMREC diary](https://www.fisheriesireland.ie/imrec-diary)¹ (Wögerbauer, 2024).

¹ <https://www.fisheriesireland.ie/imrec-diary-sign-up>



Image: Bass angler in Clonakilty, Co. Cork, Ireland.
Photo courtesy of Angling Ireland, Inland Fisheries Ireland

3.3.1 Declining abundance and size

Anglers frequently reported that their personal records demonstrate a decline in the percentage of larger fish caught in recent years, which they linked to the spate of poor recruitment years and overfishing that led to the recent emergency measures (Defra, 2023). Indeed, the BASS catch recording scheme consistently shows only around 2% of bass are caught at lengths of 60cm or above. One angler who has been fishing along the Dorset coast for the past 50 years reported a marked decline in bass size, noting that during the 1970s and 1980s the average was around 4lb but now is below 2lb. He believes the size decrease coincided with increased use of gill nets and said that their local stocks have never recovered. Another angler reported a decline in large bass over the last five years in the Sussex area by looking back over their 15-year personal logbook. Other discussions centred around reports of increased bass cannibalism and whether intensive bait fishing means that there is less for them to eat. David Curtis suggests that *“MSY [Maximum Sustainable Yield] is suboptimal for a commercial fishery and this is even more true for a fishery that includes recreational fishers who value higher abundance and larger fish and many of whom practice Catch & Release”*. Curtis suggests that the best way to increase the number of large fish in a population is to not increase harvest rates as the stock grows (EAA & EFTTA, 2018).

3.3.2 Changes in timing

Anglers at the symposium reported post-spawned bass arriving back later than usual in the southwest shores, with one attendee saying that in Restronguet near Falmouth in Cornwall they used to arrive in June, but now it is more likely to be August. Anglers also exchanged stories of finding bass in saltmarsh creeks around Blackwater Estuary

from late May/June, and larger fish from late August. Also, late spawn timing has been observed by anglers, with Dave Taylor noting “*We were catching roed up bass through April and into May, even in June the males we were catching could be described as “very excitable” upon landing!!!*” (CBIG, 2023)



Images: UK angler Bill East shares catch stories at the symposium (left) and Frank Birkeland holding his catch in Bergen, Norway (right).

3.3.3 Unusual places – moving North

While anglers reported fishing rates dropping off in the south and southwest UK, from the Humber upwards, bass catches are reportedly becoming more common year after year. Anglers reported catches as far north as Bergen, Norway (see image above), and one angler talked about regularly catching 4lb bass on the Humber and catching a 7lb bass in Grimsby. Catches are also reportedly becoming more common along the northern half of the Irish coast too. This is leading anglers to question if the fish nurseries are also moving north? Supporting the patterns being observed in Portugal (Tanner, 2024), anglers also reported catching bass in freshwater habitats, with one angler catching bass while fishing for pike with lures and dead bait on the Norfolk Broads and another catching bass deep into the London Docks.

3.3.4 Surprising distribution of larger bass

Robin Bradley of BASS described some of the interesting ‘catch stories’ being shared amongst his community. As reported above, larger bass (>60cm) tend to be more rarely caught nowadays. However, there are reports of some very large individuals (up to 15lb) being caught by commercial hook and liners in the Poole Harbour/Dorset area late in the year or in the summer months. A Cornish commercial fisherman has a theory that these fish are from a separate stock – could these be coming up from the Bay of Biscay? Tagging data reported by Woillez (2024) suggests that this is indeed possible.

4. BARRIERS AND SOLUTIONS

4.1 Increasing angler participation and bass monitoring in general

There is already a lot of bass research happening across the UK and Europe, and, as the symposium demonstrated, anglers are knowledgeable and willing to engage in science. Indeed, many anglers are already participating in bass surveys across the UK through organisations like [BASS](https://www.ukbass.com/)² and their associated Cornwall Bass Investigations Group, and by sharing their catch data through apps like the [Sea Angling Diary](https://www.seaangling.org/)³.

Some of the data being collected is already informing policy and management efforts such as ICES stock assessments (see Section 4.4.3). There are an estimated 700,000 anglers in the UK alone (Hyder *et al.*, 2024), potentially representing an important resource to support often patchy and under-funded monitoring efforts. As such, encouraging and enabling more anglers to share their catch information and collaborate more readily with scientists could have significant impacts for developing the evidence base further. However, it is also acknowledged that there are a number of barriers to engaging anglers in science and expanding data collection and monitoring studies more widely.

During the symposium, anglers, scientists and policymakers worked together to identify some of the barriers to performing data collection and monitoring, and how they could be overcome to improve the evidence base informing policy and management. Below we provide a detailed analysis of the workshop responses, summarising the barriers and potential solutions identified. Then, in Sections 4.2 and 4.3, we explicitly link barriers to solutions, illustrating both with direct quotes from the symposium. We also outline examples of tools or cases where progress has already been made in the hope that these can provide a template for future progress elsewhere.

² <https://www.ukbass.com/>

³ <https://www.seaangling.org/>



Image: Attendees at the *All About The Bass* Symposium discussing barriers and solutions (left) and angler catch stories and the locations of survey efforts (right)

4.1.1 Barriers to participation

An analysis of workshop responses identified **four overarching barriers** reducing angler participation in bass data collection and monitoring – lack of **Trust, Motivation, Accessibility** and **Awareness**. Two additional barriers were also identified that related more to wider monitoring efforts and their associated datasets – **Data Quality** and **Resources**. Attendees agreed that there is a general lack of awareness about citizen science opportunities among anglers and the public. There is also a feeling within the angling community that their perspectives are not valued or adequately included in decision making, and also that fisheries policies tend to be too blunt and favour the commercial sector. Where there is angler involvement in sample or data collection, a lack of visible action from the associated research and engagement initiatives can create stakeholder fatigue and demotivate further involvement. Furthermore, bureaucracy, a lack of training and ethical considerations can prohibit angler involvement in some research studies, particularly those involving fish tagging, where the need for home office licences in the UK can prohibit participation. More widely, there is a lack of shared protocols, standards and centralised data repositories, making it difficult to coordinate research or combine datasets to detect widespread or long-term changes in key metrics such as abundance, size or timing. Underpinning many of these issues is a lack of funding, with grants often favouring cutting-edge science rather than long term monitoring and data collection, and lack of sufficient people and time to collect, manage and synthesise the data. This is particularly important for the collection and analysis of anecdotal evidence from anglers (e.g. via interviews), which requires lengthy relationship building. Historically, fishers' knowledge has been undervalued or poorly integrated with empirical data (Stephenson *et al.* 2016).

4.1.2 Barriers identified are not insurmountable

Through analysis of workshop responses, we identified a series of **potential solutions** for each barrier. Specifically, we need to promote **Collaboration** and provide **Incentives**, **Simplify** processes, **Empower** the community, improve **Communication** and the **Coordination** of data collection efforts, and **Increase Opportunities** for all. Attendees generally agreed that there needs to be increased collaboration and communication between scientists, policymakers, anglers and commercial fishers. This requires getting to know each other through forums like *All About The Bass* and giving both anglers and fishers a seat at the table so their voices are heard and they can help shape research and policy agendas. To avoid stakeholder fatigue, we need to share results from such forums and research studies in a timely fashion so that anglers can see the impact and outcomes of their engagement. Incentives can help to motivate anglers to participate or share data, for example through financial compensation (Rudd, 2024), providing information that improves their angling experience, and/or identifying shared benefits (e.g. how the data could lead to protection measures that increase catch rates). We also need to build awareness of research opportunities through social and popular media, and to create centralised hubs to share information. To support angler participation and improve data quality and compatibility, we need to standardise sampling and data collection methods, to provide training and guidance documents, using accessible language. Finally, we need to build the network and explore new funding streams, leverage non-traditional data sources like Facebook and find ways to streamline processes such as data sharing and analysis.



Image: Steve Colclough (Institute of Fisheries Management) presenting at *All About The Bass* on the citizen science work and juvenile fish surveys he performs around the UK

4.2 Barriers and solutions at a glance: angler participation

This table links the barriers that are currently reducing angler participation in bass monitoring and research with possible solutions and examples where progress is already being made. It is based on discussions at the symposium workshop and includes verbatim quotes from participants.

BARRIERS	→ SOLUTIONS	→ EXISTING PROGRESS
<p>LACK OF TRUST</p> <p>Privacy concerns: Anglers like to keep their catch data private. <i>"I don't want others to see my catches"</i></p> <p>How data will be used: Concerned that the data anglers provide could be used against them, e.g. lowering bag limit, triggering licence requirements. <i>"...concern over licence fee for sea angling"</i></p> <p>Not being heard: Anglers feel their perspectives are undervalued. <i>"At the moment science is taking place without sea anglers' views..."</i> <i>"The Bass FMP isn't prioritising the right things."</i></p>	<p>COLLABORATE</p> <p>Anonymity: Catch data needs to remain confidential (e.g. 'jittering' specific locations on maps). <i>"Make it clear that data will remain anonymous. Especially angling mark information."</i></p> <p>Transparency: Clearly outline how data will be used at the outset of projects and the potential policy outcomes. <i>"Brief video explaining what the intended use of data will be."</i></p> <p>Shape agenda together: Develop channels for anglers, fishers, scientists and policymakers to collaborate & engage in decision making. <i>"Let's work together on what evidence base is most needed."; "Angler / scientist panel - regular forums"</i></p>	<ul style="list-style-type: none"> • The Sea Angling Diary gives diarists the choice of privacy or sharing locations. • Anglers are an integral part of the Defra and Welsh Government "Bass Management Groups" (BMG) tasked with taking forward implementation of the FMP and were included in the FMP Policy Lab that took place in July 2022 (Defra, 2023). • Other options for continued forums: BASS AGMs; future <i>All About The Bass</i> Symposia; future Defra FMP events. • Sea Angling Diary shares monthly newsletters with diarists to update them on the project, providing preliminary data and news.

BARRIERS	→ SOLUTIONS	→ EXISTING PROGRESS
<p>LACK OF MOTIVATION</p> <p>Lack of benefits: Anglers do not see the potential for positive outcomes/rewards. <i>"[Not] being able to offer tangible benefits to contributors."</i></p> <p>Stakeholder fatigue: Unclear how participation will lead to change and feeling that angler knowledge is undervalued. <i>"We know enough already to make significant changes. The key is actually making those changes"</i> <i>"Not enough credence given to anecdotal evidence of anglers".</i></p>	<p>INCENTIVISE</p> <p>Rewards: Most anglers have a natural fascination with fish and their life traits, it's why they are anglers. Providing useful information & pictures, and potentially also rewards and remuneration could help to incentivise engagement. <i>"Personalised feedback, local tides, methods ... really improve an angler's fishing."</i> <i>"Vouchers for tackle shops".</i></p> <p>Feedback & elevation: Provide feedback in a timely fashion and clarify how data and angler knowledge is used by researchers and policymakers. <i>"Short time frame feedback"</i> <i>"Annual reports"</i> <i>"Communicate the importance of providing data to get a seat at the table"</i></p>	<ul style="list-style-type: none"> • Measures that impact anglers (e.g. bag quota and closure period) appear to be having a positive effect on stock size (Hyder 2024). • Angler-led juvenile monitoring efforts were instrumental in the publication of Watson <i>et al.</i> (2024). • The Sea Angling Diary app provides a neat online logbook with competitions and rewards for the user (while providing data for monitoring) - mutual benefits. • Angler knowledge is already valued but more forums like <i>All About The Bass</i> would help to elevate this further.

BARRIERS	→ SOLUTIONS	→ EXISTING PROGRESS
<p>LACK OF ACCESSIBILITY</p> <p>Know-how: Anglers may lack the tools / training to collect high quality data. <i>"Length data is easiest for anglers. Tags - too tricky. Scales- risk of poor handling."</i></p> <p>Language: Jargon and technical language can be alienating. <i>"Language/non-technical communication."</i></p> <p>Regulatory & ethical constraints: Lack of clarity around animal handling & tagging, and what constitutes a licensed procedure in the UK. The UK also has stringent animal protection laws which hold license holders to account, meaning Universities are often unwilling to contribute to angler tagging efforts. <i>"For fish surveys ...it can be awkward to get consent."</i> <i>"Collecting scales or tagging for management purposes is not procedural... It's a bit of a grey area"</i></p>	<p>SIMPLIFY & EMPOWER</p> <p>Training & tools: Provide training and tools (e.g. measuring boards and phone apps, waterproof notebooks such as 'Rite in the Rain' for recording data) so anglers can share data and photos. For tagging, training is essential to ensure fish welfare. <i>"Look at what is possible for different expertise - location and length easy to share (phone app) - provide free tape measures"</i>.</p> <p>Guidelines: Provide simple instruction manuals with photos & videos. <i>"Fish handling code"; "Accessible language"</i></p> <p>Lobbying & peer pressure: There are no active bass tagging programmes currently in the UK, but symposium attendees thought angler-led tagging studies are a good idea. Anglers are advocates for fish welfare and using best practices. New tagging programmes could potentially be developed in the future, modelled on the Cefas/BASS historical programme and/or current programmes with IFI (www.fisheriesireland.ie/what-we-do/research/national-bass-programme) or NOAA (www.fisheries.noaa.gov/resource/document/cooperative-shark-tagging-program). <i>"Social norms e.g. bottom-up approach, peer pressure"</i></p>	<ul style="list-style-type: none"> • Many of the tools and skills are often already there, e.g. phone apps like Sea Angling Diary. • IFCAs have created manuals with best practices for fish sampling (https://tinyurl.com/IFCA-Fish-Survey-Best-Practice) and fish ID guides (https://tinyurl.com/IFCA-Fish-ID). • IFI, Cefas and NOAA run successful angler-led tagging programmes for bass, tuna and sharks, respectively, and historically, Cefas have supported angler-led bass mark-recapture studies (e.g. www.ukbass.com/bass-tagging; the data used in Wright <i>et al.</i>, 2024). It should be possible to do this again, it would just need funding and a clear research gap to address.

BARRIERS	→ SOLUTIONS	→ EXISTING PROGRESS
<p>LACK OF AWARENESS</p> <p>Closed door: Anglers are not aware of research projects or how to get involved in them. <i>"Raising awareness ... is key to enlisting involvement and support"</i> <i>"Increase awareness of apps currently available"</i></p> <p>Policy needs: Lack of coordinated communication of research / policy needs as they arise. <i>"Communicating clearly what data is needed."</i></p>	<p>BETTER COMMUNICATION</p> <p>Widen network: Use 'boundary spanners' like BASS & the Angling Trust, and supportive social media influencers like Henry Gilbey and Fish Locker, and traders to share news and opportunities. <i>"Raise awareness among anglers – adverts, blogs, Youtube shorts"</i> <i>"Tackle shops"</i> <i>"Posters with links"</i> <i>"Mortimer and Whitehouse (fishing shows)"</i> <i>"Branding - Marketing - telling people about the good work that is being done ... point them to a website/ hub."</i></p> <p>Engagement: Regular meetings with interdisciplinary groups including scientists, stakeholders, managers and policymakers.</p>	<ul style="list-style-type: none"> • The University of Essex created the Bass Information Hub to promote current citizen science opportunities (Section 4.4). • BASS blogs, newsletters, AGM (e.g. https://www.ukbass.com/all-about-the-bass-symposium-2/; https://www.essex.ac.uk/blog/posts/2024/08/09/all-about-the-bass) • Defra's Bass Management Group meets each quarter and collaborates with stakeholders from the recreational and commercial sectors to discuss areas of interest such as FMP goals and management decisions in English waters. Representatives have now been confirmed, but if you have any questions email: BassFMP@defra.gov.uk (Elliot, 2025).

4.3 Barriers and solutions at a glance: wider monitoring needs

This table links the barriers hindering wider bass monitoring efforts with possible solutions and examples where progress is already being made. It is based on discussions at the symposium workshop and includes verbatim quotes from participants.

BARRIER	→ SOLUTION	→ PROGRESS
<p>POOR DATA QUALITY</p> <p>Standardisation: Lack of consistent frameworks & methods. <i>"...CEFAS; EA; NE; IFCAs have different ways to capture and store data. This makes it very difficult to work efficiently." "lack of conformity on data between researchers."</i></p> <p>Misinformation: Anglers worry that catches and gear types are misreported to allow larger quotas. <i>"Misreporting of catch by commercial fishermen, gear misallocation related to current legislation -> rod/line bigger allocation than nets."</i></p>	<p>BETTER COORDINATION</p> <p>Centralise: Central coordination of research & data hubs with clear and consistent frameworks and standards. <i>"Better across-organisation management and data hosting ...access to transparent data." "Long term & comprehensive sampling protocols needed."</i></p> <p>Trust & automation: Create forums for anglers & fishers to come together to share concerns. Use automated data collection technology to build a more accurate picture of what is being caught, by whom and where. <i>"...[use] remote electronic monitoring (REM) to record what is being landed ..."</i></p>	<ul style="list-style-type: none"> • IFCAs have created manuals with best practices for fish sampling and ID guides (links above). • The University of Essex created the Bass Information Hub to help users locate studies and datasets (see Section 4.4). • The Environment Agency has compiled environmental data (including fish) into a single data explorer (https://environment.data.gov.uk/ecology/explorer/) and Defra has added a lot of spatial data into Magic Maps (https://magic.defra.gov.uk/magicmap.aspx). • Defra plans to expand the use of REM in English waters over the next five years (https://tinyurl.com/REMinEnglishWaters) to help fill data gaps and address concerns about fishing activity in English waters (Robertson <i>et al.</i>, 2024).

BARRIER	→ SOLUTION	→ PROGRESS
<p>RESOURCES</p> <p>Funding: Lack of funding and misaligned grant priorities. <i>"For research the main driver is funding. Grants normally last for 3 years so long-term monitoring is impossible. Also, the drivers for many grant sources - cutting edge sexy science mean that long-term monitoring won't get funded."</i></p> <p>People and time: Limited availability of people with suitable data analysis or field skills. <i>"Lack of long-term human resources to handle data." "fish surveys [are] popular but attendees are unwilling to commit for a lengthy period of time."</i></p>	<p>INCREASE OPPORTUNITIES</p> <p>New sources: Citizen science projects might be eligible for alternative funding. <i>"Lottery funding or some other non-traditional science finding source?"</i></p> <p>Collaborate and streamline: To reduce burden and duplication of effort, work collaboratively and share data openly. Strengthen links with universities as students could perform synthesis efforts as part of their research projects. <i>"Increasing awareness of data that already exists, including that collected for different purposes?"</i></p>	<ul style="list-style-type: none"> • The University of Essex created the Bass Information Hub to help users find out about current citizen science opportunities (Section 4.4). • The Institute of Fisheries Management (Colclough 2024) provides training to volunteer groups that wish to perform juvenile fish monitoring. • Universities (e.g. Essex, Plymouth, Bangor) undertake additional juvenile fish monitoring and there may be scope for them to include anglers and members of the public in the future.

4.4 A step in the right direction: The Bass Information Hub

In response to barriers around communicating, coordinating and sharing information, more easily, researchers at the University of Essex have created a [Bass Information Hub](https://www.essex.ac.uk/research-projects/bass-information-hub), which is a website divided into three parts: (1) **All About The Bass** comprising an overview of bass biology, ecology and management, with useful links to broad reviews, the UK Bass Fisheries Management Plan, and slides/talks from our All About The Bass 2024 Symposium, (2) **The Bass Data Map**, signposting users to bass data collection efforts, past and present, and where to locate the associated reports and datasets, and (3) **Get Involved** which gives a list of opportunities for anglers and the general public to participate in current bass monitoring activities. Ultimately, we hope that this hub will help us to learn from each other and work together to improve the health and sustainability of European sea bass.

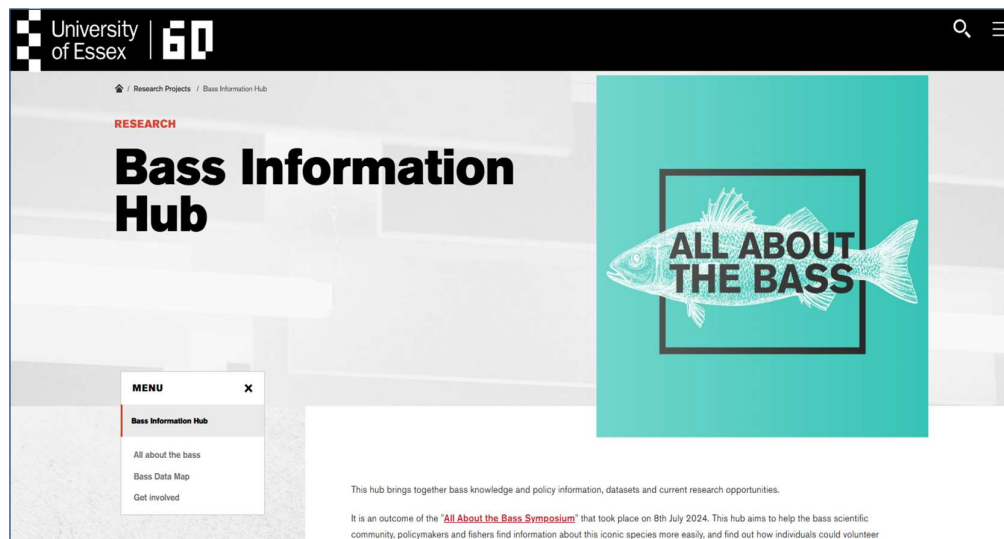


Image: Screenshot of main landing page of the Bass Information Hub (<https://www.essex.ac.uk/research-projects/bass-information-hub>)

4.4.1 The Bass Data Map

An ongoing barrier identified in the workshops was a lack of coordination and visibility of bass relevant datasets. As such we have created a page on the Hub entitled the “Bass Data Map”. The map signposts you to bass data collection efforts, past and present, and where to locate the associated reports and datasets. The map can be filtered by:

- 1) Environmental Agency Fish TraC sites
- 2) University of Essex tissue bank sampling sites
- 3) Other bass datasets

These datasets are also available to view by clicking on each data point (see screenshot below) or by downloading the entire spreadsheet from the main site.

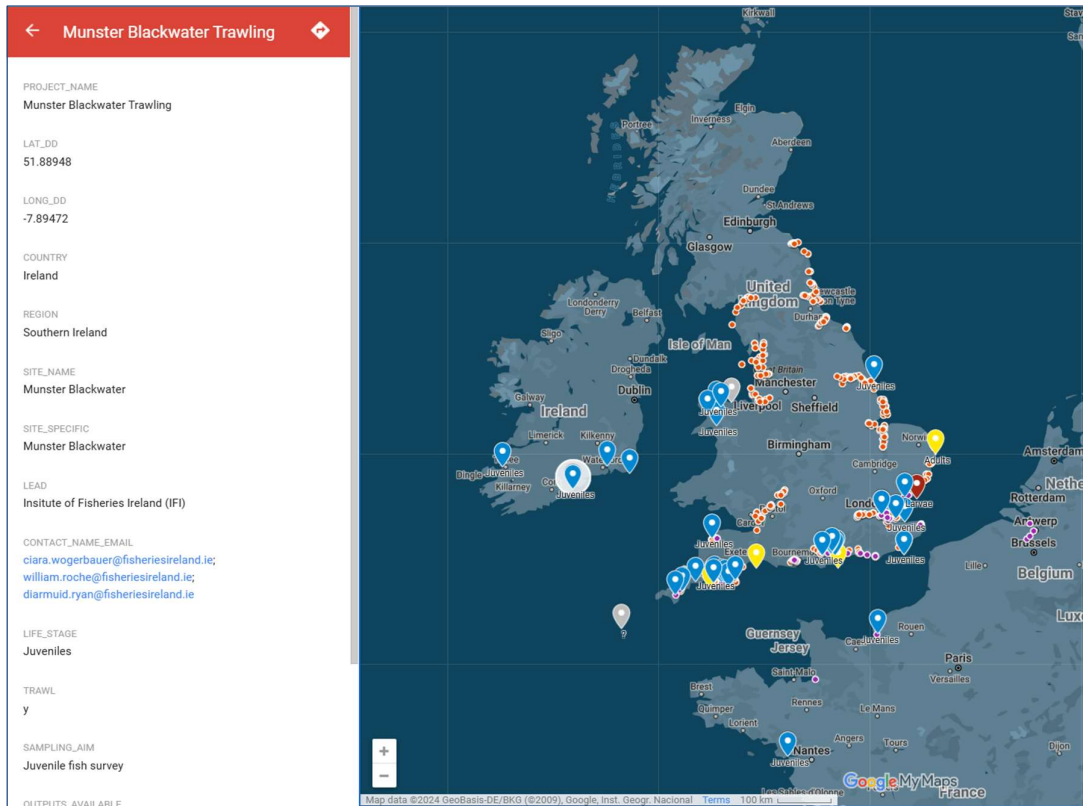


Image: A screen shot of the Bass Data Map showing the information recorded for each location

4.4.2 Awareness of current opportunities

Anglers and the general public are keen to get involved in bass monitoring and data collection but aren't always aware of available research activities and opportunities. To help communicate these, we created a third page on the Bass Information Hub which showcases current opportunities for anglers and the general public to get involved in. Some involve sharing catch data via mobile apps/questionnaires, others around tissue collections, and others around juvenile bass surveys using seine and fyke nets.



Image: Volunteers for the Cornwall Bass Investigations Group seining on the Fal

4.4.3 Why angler participation is so valuable

One of the barriers to angler participation in research raised during the symposium is that anglers are unclear how data will be used and how participation will lead to change (See Table 4.2. Barriers and Solutions At A Glance). In response to this, the infographic below summarises some of the tangible ways monitoring data is being used and some of the reasons why angler participation is so valuable. Currently, anglers can take part in juvenile fish surveys (Cornwall Bass Investigations Group and Living Rivers Foundation in the Medway), catch recording schemes (IFI, BASS and Cefas [Sea Angling Diary] recording schemes), tissue collections (IFI scale collections and University of Essex's *Supper4Science* programme, although this is on hiatus until summer 2026). Angler led tagging is occurring in Ireland currently (IFI) but not currently in UK, although there was a [scheme led by BASS in the early 2000s⁴](#) that contributed data to a recent ICES workshop focused on whether the Northern Stock boundary was correctly placed (ICES 2023) and combined with electronic data in Wright *et al.*, (2024).

⁴ <https://www.ukbass.com/bass-tagging/>

How angler involvement in research improves wellbeing, knowledge and decision-making

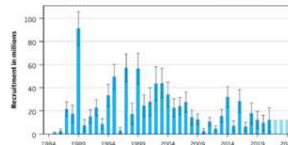
JUVENILE FISH SURVEYS

WELLBEING & KNOWLEDGE



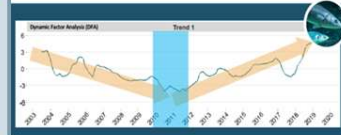
Netting juvenile bass is sociable and great exercise. It's also fascinating to get to know different estuaries and the species inhabiting them, and to understand more about where the adult bass begin their life.

STOCK ASSESSMENT



Annual cohort strength for the Northern Stock is estimated from a recruitment index (ICES 2023; above plot) based on Cefas' annual Solent survey. Future assessments will hopefully also include BASS survey data.

SCIENCE



To understand and predict the influence of climate change on bass recruitment we need long-term juvenile fish surveys (figure above from Lourenço et al. (2023) in Portugal; also see Watson et al (2024) for UK estuaries).

CATCH RECORDING

WELLBEING & KNOWLEDGE



Logging catches in physical books or apps increases angler knowledge and skills by allowing them to link their catch data to tides, weather, lures, bait type etc. Spending time in nature is also good for mental health.

STOCK ASSESSMENT



Estimating recreational fishing mortality is essential for any stock assessment. Bass catch data recorded in the Sea Angling Diary was integral to the latest stock assessment.

SCIENCE



Catch records reveal changes in angler behaviour (% released), species composition, fish size and abundance. Data from the Sea Angling Diary were integral to Hook et al. (2022) and Hyder et al. (2024; above figure).

TAGGING & TISSUE COLLECTION

WELLBEING & KNOWLEDGE



Eating fish provides health benefits, while donating tissues (e.g. *Supper4Science*) and participating in tagging projects allows anglers to learn more about the fish they catch (e.g. age and movements). Tagging also links fishing communities within and among countries.

STOCK BOUNDARIES



Understanding bass stock structure & mixing patterns (e.g. figure above from ICES 2023) relies heavily on movement data, including BASS tagging data from Wright et al. (2024)

SCIENCE



Conventional tags and natural tags in otoliths & eye lenses can be used to reconstruct movements. Age and spawn date can be estimated from growth rings in scales & otoliths (e.g. 10 yr old bass in image above donated for *Supper4Science*).

Infographic highlighting some of the opportunities for angler participation in data collection, and the benefits of getting involved, to the angler and for science, management and policy.

5. KEY RECOMMENDATIONS

The following recommendations for policymakers, researchers, institutions, angling organisations involved – or considering getting involved – in bass research or monitoring activities. The goal was to identify how citizen science and angler-scientist collaborations could help to fill the bass FMP evidence gaps and ultimately inform management and policy. The recommendations are based on both the workshop discussions and post-event feedback, and are intended to be challenging but achievable, ranging from quick wins to bigger ideas that will need to be developed over time. All will be revisited, discussed and revised at future symposia.

Build Trust ⇔ Collaborate:

- Ensure privacy of angler catch data, particularly specific locations.
- Be clear at the outset of research projects about how they might influence policy and management decisions. This will build trust and interest.
- Create more forums that bring together policymakers, scientists, anglers and commercial fishers. Many attendees requested us to repeat the [All About The Bass](#) symposium every other year, with fewer but more in depth talks and an increased focus on the socio-economic impacts of angling and fisheries.
- Include all parties in shaping the research and policy agenda and clearly communicate the objectives, purpose and intended outcomes.
- Share progress and outcomes of projects and forums with participants.

Increase Motivation ⇔ Incentivise:

- Create reciprocal sharing mechanisms between researchers and anglers. This could be simple rewards for sharing data or samples, such as creating certificates with information about the fish an angler has caught or tagged (e.g. size, age, origin), or sharing more complex data which is of use to anglers (e.g. sea conditions) via mobile apps like the [Sea Angling Diary](#) and [IMREC Diary](#).
- Identify and discuss mutual interests between different parties, e.g. protection of the largest, fecund females in a population or the socio-economic benefits of angling to increase motivation to participate in research activities.
- Ensure that participants can access results of research or engagement activities in a timely fashion using accessible and digestible formats, e.g. articles in angling press, follow-up emails or short reports.

Increase Accessibility ⇔ Simplify & Empower:

- Close the communication gap between scientists and anglers with clearer language, standardised guidelines, training videos and instruction manuals.

- Provide tools such as measuring boards, waterproof notebooks, mobile apps and hands-on training to increase uptake and ensure fish welfare and data quality.
- In the longer-term, explore options for angler-led tagging studies such as the [NOAA Fisheries](#) shark tagging programme, [IFI's bass tagging programme](#) and BASS/Cefas' [former bass tagging programme](#) (links provided in full in Table 4.2).

Increase Awareness ⇨ Communication:

- Go beyond academia to build the network - use social media, Facebook communities, angling podcasts, fishing shows, tackle shops and tradeshows to promote research and opportunities more widely. A long-term aim should be to boost scientist-angler engagement and make two-way data sharing the norm.
- Use 'boundary spanners' like BASS and the Angling Trust to share research opportunities, findings and management updates with their members.
- Create centralised platforms such as the [Bass Information Hub](#) to share research opportunities, datasets and other outputs (Section 4.4).

Increase Data Quality ⇨ Coordinate:

- Strengthen cross-organisation oversight and develop shared data hosting sites and clear frameworks (e.g. handbooks defining optimal methods for juvenile fish sampling in different environments, and spreadsheet templates with standardised fields and heading names) to enable better comparison of datasets. Efforts such as [Defra's Magic Maps](#) (link written out in Table 4.2) are valuable but require large scale coordination, funding and oversight.
- Explore automated data collection (e.g. Remote electronic monitoring (REM) on commercial fishing boats to record catch information).

Increase Resources ⇨ Maximise Opportunities

- Funding for long-term monitoring projects and data collection is limited but - particularly for efforts involving citizen science - it may be possible to leverage novel and non-traditional funding sources such as the National Lottery.
- Maximise sampling and data collection efforts and reduce duplication of effort by sharing data and information (see [Bass Information Hub](#), Section 4.4).
- Strengthen links with universities, as student projects could be designed to focus on knowledge gaps and data synthesis efforts.
- For regular or long-term tissue collections (e.g. *Supper4Science*),
- For regular or long-term tissue collections (e.g. *Supper4Science*), streamline processes (e.g. set up storage systems and alerts with fishers and processors).

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7. APPENDIX

7.1 SPEAKER BIOGRAPHIES AND ABSTRACTS

All presentation slides and videos can be downloaded and viewed at the symposium website: <https://tinyurl.com/BassEvent>

Keynote speaker: Dr Kieran Hyder (Cefas)

Abstract: Sea bass biology, ecology, & fisheries

The European sea bass (*Dicentrarchus labrax*) is widely distributed across the northeast Atlantic. Sea bass are slow growing late maturing fish that have a complex life cycle, with adults migrating between feeding and spawning area. Adults aggregate to spawn with eggs and larvae drifting in the currents before settling in estuaries and shallow embayments. Fish will remain in nursery areas for 4-6 years before joining the adult population. Sea bass is a high value fish that is exploited by both commercial and recreational fisheries. Scientific assessments of sea bass in the North, Irish and Celtic Seas and the Channel have shown a rapid decline in the spawning stock biomass attributed to poor year class strength and high fishing mortality, and significant reductions in the harvest of sea bass have been implemented to conserve stocks. This talk will provide a short summary of the current scientific knowledge of sea bass biology, ecology, and fisheries for sea bass around the UK.

Biography

Dr Kieran Hyder is a Principal Fisheries Scientist at Cefas, which is part of the UK government. His research centres on the application of science to support policy and management of fisheries. Kieran leads research on sea bass genetics, connectivity, nursery grounds, spatial modelling, and fisheries assessment. He provides advice to Defra on sea bass and contributes to the stock assessment done by ICES. A lot of his research has focused on impacts and benefits of marine recreational fisheries, and he chairs the ICES Working Group on Recreational Fishing Surveys. He holds an Honorary Senior Lectureship at the University of East Anglia and has published over 80 peer-reviewed papers.

Speaker: Dr Mike Ladle (Bass angler)

Abstract: A fisher's view of bass populations

Over millions of years the bass, a long-lived fish, has evolved strategies to cope with life's many ups and downs. Year to year survival and growth are affected by variations in food supply, disease, and predation, all influenced by changes in climate, weather, and water quality. We are now aware that most of these factors are also affected by human activities. Added to these 'natural regulators', in recent decades bass have become a trendy, high value, food species and a popular angling catch: so, they must now suffer the added impacts of high tech commercial and sport fishing. Attempts to sustain bass stocks and maintain a satisfactory population structure for future years will require more science and less greed from us all. This short account suggests a few of the problem areas and possible solutions.

Biography

Mike lives in Dorset and is now retired. He has a PhD in Marine Ecology and is a lifelong angler. For almost forty years he carried out ecological research on the fish and invertebrates of chalk streams and published many scientific papers and magazine articles as well as a number of books including the popular "Operation Sea Angler" and "Hooked on Bass". He has also lectured extensively and still goes fishing whenever he gets the chance. His website, [Operation Sea Angler⁵](http://www.mikeladle.com/), now extends to thousands of pages on many aspects of angling and the related biology of marine fishes.

Speaker: Hannah Rudd (Angling Trust)

Abstract: Building angler-science collaborations

Hannah Rudd talks about some of the participatory projects she has worked on as part of the Angling Trust and offers tips and guidance for successful collaborations between scientists and anglers.

Biography

Hannah Rudd is a marine scientist, specialising in sharks and recreational fisheries. She is passionate about science communication and effecting change through

⁵ <http://www.mikeladle.com/>

marine policy. She currently works for the Angling Trust leading on marine policy and research. Through her work at the Angling Trust, Hannah is also a member of the European Anglers Alliance - representing recreational anglers across Europe.

Speaker: Dr Howard Freeman (University of Essex)

Abstract: Understanding genetic connectivity patterns of European sea bass: Insights from Supper for Science

A basic requirement for sustainable marine fisheries management is a thorough geographic understanding of stock delineations. These are largely based on patterns in population connectivity, which are in turn dependent on linkages between spawning and juvenile settlement areas. Important questions remain regarding the population structure of European sea bass across its range. Understanding the relatedness of juvenile sea bass between adjacent and distant settlement sites and to adult populations can help reveal, and better define, the origins and boundaries of stocks. To do this we are genotyping juvenile and adult sea bass from UK estuarine and coastal systems, caught by ourselves and BASS anglers as part of the Supper4Science project, to understand relatedness within and between areas. Collectively, we will discuss how this project is succeeding, what could have been done better, how we can increase engagement in the future, and finally where we will be taking this work next.

Biography

Dr Howard Freeman is a postdoctoral researcher. He is a coastal ecologist whose research focuses on how individual animals interact with all aspects of their environment and how this influences physiological processes, behaviour, and population level responses. He completed his BSc and MRes at the University of Plymouth and Marine Biological Association where he investigated diel vertical migration patterns in plaice. He completed his PhD at the University of Essex on the drivers of recruitment variation in sea bass, focussing on understanding habitat associations, larval settlement mechanisms, and overwinter survivability. He is currently involved with a FISP funded project to develop a sea bass tissue bank to better understand patterns in the connectivity of sea bass nurseries around the UK.

Speaker: Dr Anna Sturrock (University of Essex)

Abstract: An Eyes and Ears approach to estimating the contribution rates of different bass nurseries to the adult stock

As most mortality in marine fishes occurs during early life stages, quantifying variation in growth and survival among estuaries is critical to performing targeted protection or restoration measures. Here, we sampled newly settled juvenile bass from 19 estuaries along both sides of the English Channel and Portugal in 2022-23 and analysed their otolith ('earstone') and eye lens chemistry to build a chemical reference library and test the reliability of this method for identifying fish nursery area. The early results are promising, with significant differences in chemical signatures among estuaries that appear to be driven by variation in water chemistry and local food webs, with some potential influence of sewage pollution. We will now analyze the juvenile growth layers in the adult eyes and ears to estimate the contribution rates of each nursery area to the fishery, and to see whether it is predicted by habitat type/quality, juvenile abundance and/or condition.

Biography

Dr Anna Sturrock is a Senior Lecturer and UKRI Future Leaders Fellow at the University of Essex. She primarily uses natural tags in archival structures such as otoliths and eye lenses to understand fish movements and health, generating empirical data to inform sustainable ecosystem management in a changing climate. She completed her undergraduate degree at the University of Edinburgh, her Masters at the University of Otago in New Zealand, and her PhD at the University of Southampton and the Centre for the Environmental Fisheries and Aquaculture Science. From 2012 to 2020 she was a researcher at the University of California Santa Cruz, Berkeley, then Davis focused on salmon and water management. Since moving back to the UK in 2020 she has been working her way back up the salinity gradient in projects focused on sea bass, flatfish, tuna, eels, cod and anchovies, particularly using chemical tracers to reconstruct nursery ground contribution rates to the adult stock.

Speaker: Joe Dawson (University of Essex)

Abstract: How otolith growth rings reveal mismatches between spawn timing and fisheries closure periods for UK and European bass populations

European seabass (*Dicentrarchus labrax*) is a species of high economic importance in the UK, supporting both a commercial fleet and a highly prized recreational fishery which is likely to become increasingly dominant due to poleward migration.

Recruitment of juvenile *D. labrax* dropped sharply from 2009-2018, principally linked to high fishing mortality. Emergency measures have been in place since 2015 in attempts to ameliorate effects of successive poor year-class strength, primarily through the establishment of an annual fisheries closure over a two-month February-March window targeting proposed spawning timing. This work examined spawning and settlement timing, condition and growth rates through the use of otolith microstructural analysis (counts and widths of daily growth rings). Results found significant mismatch between the timing of fishery closures and the spawning date of cohorts (back-calculated median spawn date = May 5th \pm 17 days SD), suggesting that the closure may be too early to effectively protect these stocks.

Biography

Joe Dawson is a researcher at the University of Essex. He is principally interested in the use of natural tags and biochronologies (growth rings) to track fish movement, growth and phenology, and how this data can inform species management. He completed his undergraduate degree at the University of Exeter before completing a research masters at Bangor University examining the spawning and recruitment timing of juvenile sea bass into North Welsh nurseries. He is now expanding this work to cover UK and EU juvenile sea bass populations to examine the effectiveness of current protection measures. He can be found throughout the warmer months with rod and reel in hand on various stretches of UK coastline.

Speaker: Dr Ian McCarthy (University of Bangor)

Abstract: Welsh sea bass spawning: when and where?

The European sea bass (*Dicentrarchus labrax*) is a highly prized commercial and recreational species in Welsh waters. In this talk, Ian presents data on when and where sea bass in Wales are spawning. Current sea bass management has a closed

season in February-March, however, data collected from Welsh sea bass indicates that they are spawning in March-May. This is based on the size and appearance of the gonads in adults and from spawning dates estimated from otolith daily growth increment counts in 0-group bass. We have also used three-dimensional hydrodynamic and Lagrangian particle tracking models, run in reverse, to identify probable spawning locations. This modelling indicates two broad spawning areas: the central Irish Sea providing recruits to north Wales and northwest England, and the southern Irish Sea/Celtic Sea providing recruits to south Wales. Surface temperatures and wind- and tide-driven surface currents determined the connectivity between spawning and settlement sites. Atmospheric drivers are expected to change in the future and management needs to account for potential regional shifts in spawning times and locations.

Biography

Dr Ian McCarthy is a Reader in Fish Biology in the School of Ocean Sciences at Bangor University. During a 30-year academic career, his research has included work on a range of freshwater and marine fishes (e.g. salmonids, cyprinids, cichlids, smelt, sciaenids, flatfish, triglids, mugilids, sea bass, wolffish, skates, sharks), plus the occasional study on invertebrates, within the broad fields of physiology, behaviour and ecology. He has worked on sea bass in Wales for 20 years with a particular interest in population biology, movement patterns and connectivity of sea bass in the Irish and northern Celtic Seas.

Speaker: Steve Colclough (Institute of Fisheries Management)

Abstract: Juvenile bass in saltmarshes and other intertidal areas

Steve Colclough has sampled juvenile bass since 1985. He initiated a multi-method survey in the Thames estuary, sampling foreshores, saltmarshes and artificial terraces. This work went on to lead the UK development of estuarine fish sampling for WFD. In 10 years Steve and his team sampled over 80 estuaries across England, Wales and Scotland. They held a European field lead and conducted collaborative surveys across Europe. Juvenile bass were a major component in many of these estuaries from the mouth to the lower freshwater reaches. Since 2003, Steve has also sampled saltmarshes and constructed managed realignments across England (40

plus sites, some on multiple occasions). These can be key early life stage nurseries for bass. Recently Steve has trained local citizen scientists to deliver the surveys. Steve will share his observations on how juvenile bass and other species utilize saltmarshes and how this is now influencing site designs and advocates mimicking a natural marsh to optimise fish usage. Evidence that juvenile bass use the same habitat for the first summer suggests that we can significantly increase bass production by building new habitats in a sympathetic style.

Biography

Steve Colclough led a national Environment Agency team in the 00's that developed a multi-method fish survey programme for Water Framework Directive in transitional waters, later recognised as European Best Practice. Over that period Steve began to sample fish communities associated with salt marshes and managed realignments, recognising that few had studied these associations in Europe. After leaving the Environment Agency in 2011, Steve set up a small consultancy and is Chair of the Estuarine & Marine Section of the Institute of Fisheries Management (IFM). The principle aim of the IFM is to promote more sustainable fisheries management in fresh/tidal waters, through advocacy, training and technical support measures. Since 1985, Steve has been involved in fish sampling in 50 plus estuaries, 30 plus areas of saltmarsh and 40 plus managed realignment and saltmarsh terrace treatments. Today, Steve focuses on training groups of citizen science volunteers to conduct fish surveys in saltmarshes and managed realignments to advise on new treatment design features which will optimise fish utilisation. Throughout this work, juvenile bass have featured significantly. Steve will be providing some observations from his experiences at the symposium.

Speaker: Rachel Turnbull (University of Plymouth)

Abstract: Understanding nursery habitat requirements: variation in abundance and condition of juvenile bass in southwest English estuaries

In order to appropriately define a nursery, understanding not only in which areas juvenile bass are present, but where they are most abundant and healthiest is critical. This information enables more detailed predictions of which areas may contribute most effectively to recruitment, thus informing the more targeted allocation of

management resources. This work examined juvenile bass abundance from 24 sites across 9 estuaries in the southwest of England in May-September 2023. Additionally, this work used length: weight ratio, stomach fullness and hepatosomatic index to assess the body condition of individuals from these sites, as well as identifying patterns in these metrics within and between estuaries throughout the summer. Future work will focus on developing and refining more cutting-edge methods for assessing condition in the context of assessing periods of food deprivation, which is a common challenge faced by juvenile fish.

Biography

Rachel Turnbull is a PhD student in the School of Biological and Marine Sciences at the University of Plymouth. Her research focuses on the abundance, growth, and condition of juvenile bass in estuaries in the southwest of England, combining more traditional fisheries science techniques like seine surveys and otolith microstructural analysis with more cutting-edge biochemical indices. Rachel is also a member of the International Council for the Exploration of the Seas (ICES) Working Group in the Value of Coastal Habitats for Exploited Species.

Speaker: Dr Filipe Martinho (University of Coimbra)

Abstract: Long-term impacts of warming on juvenile sea bass recruitment into estuaries

Understanding how climate change affects key species is critical for species and ecosystem management and conservation. In this sense, long-term monitoring programmes appear as key tools for assessing changes in juvenile fish abundance, growth, and phenology. Firstly, we analysed the variability in recruitment of juvenile sea bass (*Dicentrarchus labrax*) and other species with similar habitat use and life history patterns in the Mondego estuary (Portugal) and assessed the effect of environmental factors for 17 years (2003-19). The model showed that juvenile sea bass abundance has been increasing since 2010-12, favoured by increasing seawater temperature. Secondly, using otoliths, we described the interannual variability in the timing and duration of hatching period and early-life growth of sea bass juveniles, over a seven-year period (2011-17), and the respective effects of water temperature. Our results provide key insights on how sea bass will cope with a warming ocean, in the context of climate change.

Biography

Dr Filipe Martinho is a researcher at the Centre for Functional Ecology and Department of Life Sciences at University of Coimbra, Portugal. His work focuses on the effects of climate change and anthropogenic pressures on marine and estuarine organisms (fish, plankton), on the use of estuaries as nurseries by early life stages of marine fishes, and on the use of otoliths to study fish migrations, habitat use, growth, and population structure. Filipe is a member of the ICES Working Group on the Value of Coastal Habitats for Exploited Species and co-leads the longest running monitoring program of estuarine fishes in Portugal, which started in 2003 in the Mondego estuary, where sea bass is one of the most abundant species.

Speaker: Dr Mathieu Woillez (French Institute for Ocean Science)

Bass population structure and connectivity: a French perspective

Because animal movements shape internal dynamics and population structure, the choice of inappropriate spatio-temporal scales for assessing populations can have disastrous effects on their exploitation. Here, we present evidence from French studies regarding biologically relevant stock boundaries of bass using tagging data, otolith microchemistry, genetic analysis, and egg and larvae drift modelling. 1466 bass were tagged along the French coast with electronic tags. More than 400 tags were recovered and their trajectories were reconstructed. Their analysis showed that migrants exhibit fidelity to summer feeding areas and to winter spawning areas. Otolith microchemistry confirmed the phenomenon of fidelity. Combined genetic and tagging analysis described the seasonal dynamic of the bass spatial structure. Drift model evidenced eggs from Biscay spawning grounds substantially contribute to northern bass nurseries depending of ocean conditions. Those results challenge our understanding of the functioning of bass population which may have significant consequences for its management.

Biography

Mathieu Woillez holds a master's degree in agronomy, with a major in fisheries science, from the Fisheries and Aquatic Sciences Center of « L'Institut Agro Rennes-Angers » (2001) and a doctorate in geostatistics from the Geostatistics Center of «

Mines Paris – PSL » (2007) on the spatial analysis and modelling of fisheries survey data. He is a researcher in marine ecology and fisheries science at DECOD Unit Research (Ecosystem dynamics and sustainability: from source to sea), Ifremer, Brest. His current research focuses on fish movement and behaviours, spatial structure of fish populations, characterisation of essential fish habitats and their connectivity and spatial dynamics of fish resources. He is involved in sea bass stock assessment at the International Council for the Exploration of the Sea (ICES), the international research body that provides scientific advice on the management of fish stocks to the European Commission.

Speaker: Dr Thomas Stamp (University of Plymouth)

Abstract: Should I stay or should I go? Insights from tracking juvenile bass in coastal sites across the southwest UK

Estuaries and coastal bays which are highly adapted by humans and at the same time known to be important nursery grounds for European bass. In the UK, 34 sites are designated and protected as Bass Nursery Areas, yet our understanding of how and why European bass exploit inshore and coastal habitats is poor. Using acoustic telemetry we tracked 146 sub-adult European bass for 814 days across three designated Bass Nursery Sites. Tagged fish were detected >5 million times, staying very local to the nursery site where they were first caught. Individual fish, were however also tracked moving up to 317km to other coastal sites, however, 81% of these fish returned to their original nursery site. The results from our work have highlighted that while individuals can and do move over large distances, juvenile bass populations are generally very associated to specific locations. Since this initial study, the research group has expanded and branched into different species and using different types of tags. As part of this talk, Tom provides an overview of different tagging techniques we (and others) use and what stories they've told us.

Biography

Dr Thomas Stamp is a Post Doctoral Research Associate in the School of Life Sciences at University of Plymouth. In collaboration with the Devon and Severn IFCA and Plymouth university, Thomas completed his PhD in 2020 on European bass movements and habitat use within estuaries. This work ranged from: yomping across

miles of muddy saltmarsh with nets a fyke net, to tracking the movements of juvenile fish using acoustic telemetry. Since then, Tom has helped co-develop one of Europe's largest fish tracking surveys and continues to work on European bass (among other species), to answer applied fisheries management questions at both regional and international scales.

Speaker: Dr Susanne Tanner (University of Lisbon)

Abstract: Not so much a sea bass: Divergent freshwater incursions of European sea bass

The existence of distinct migratory and resident individuals within fish populations has been reported increasingly. This phenomenon referred to as partial migration entails a trade-off between multiple factors and can evolve and be maintained either when different life-history strategies produce the same lifetime fitness or because of conditional strategies dependent on individuals. Several species within the family of the temperate basses (Moronidae) exhibit contingents or subpopulations, that have different movement behaviors along the marine-freshwater gradient. European sea bass (*Dicentrarchus labrax*) is a marine migrant, with juveniles commonly using estuaries and even freshwater environments. Although, the co-occurrence of residents and seasonal migrants has been reported in marine environments, there are no reports of adult sea bass using freshwater habitats. Here, we document the occurrence of adult sea bass in freshwater environments in the Tagus River, Portugal (~150 km upstream from river mouth and 80 from tidal influence) using individuals captured by anglers and data obtained by interviewing commercial and recreational fishers regarding the spatio-temporal patterns of freshwater use of adult sea bass.

Biography

Dr Susanne Tanner is a senior researcher at the Marine and Environmental Sciences Centre (MARE) and an adjunct Assistant Professor at the Faculty of Sciences, University of Lisbon, Portugal. Her research focuses on 1) estimating fish population structure and connectivity, mainly using chemical markers as well as by integrating different natural markers and modelling approaches; and 2) assessing the impacts of climate change and fishing on growth variability, fish population and marine ecosystem productivity. She is part of a multidisciplinary team investigating

movements of adult European sea bass into fully freshwater environments, a movement behavior recently described for the Tagus River (Almeida *et al.* 2023). By combining acoustic telemetry, otolith chemistry and genetics the team aims to better understand the diversity of sea bass freshwater incursions and its importance for the population.

Speaker: Dr Ciara Wögerbauer (Inland Fisheries Ireland)

Abstract: European sea bass - Bass anglers as stewards of bass in Irish waters

Since the banning of commercial fishing for European sea bass (*Dicentrarchus labrax*) in Irish waters, bass are the only marine fish species in Ireland managed solely for angling. As such, anglers play an important role in the stewardship of bass in Irish waters. Inland Fisheries Ireland runs the National Bass programme, which intertwines a monitoring programme of bass nursery estuaries and also a citizen science strand where bass anglers can measure, scale, tag and report their catches. This talk will cover the Irish estuaries where bass are encountered regularly as juveniles, and also the important contribution bass anglers make to Ireland's understanding of the adult bass population as citizen scientists. In addition, this talk will briefly include IFI's experience with data collection apps for recreational angling and angling best practice recommendations for bass and other species.

Biography

Dr Ciara Wögerbauer is research technician within the Marine Team in Inland Fisheries Ireland (IFI). IFI is the environmental agency responsible for protecting, managing, and conserving Ireland's inland fisheries and sea angling resources. Ciara has a background in Zoology and a PhD in Aquatic Ecology. Within IFI's Marine Team, she works on three programmes: the National Bass Programme, the Tuna CHART bluefin tuna data collection programme and the Marine Sport Fish Elasmobranch Tagging programme. Common themes across her work are citizen science and mark-recapture tagging. Ciara's research interests include Irish juvenile bass nurseries estuary habitat, the link between bass nurseries and the adult stock, citizen science app development, best practice angling, fish handling techniques and fish welfare.

Speaker: Dr Christina Hunt (University of Portsmouth)

Abstract: Competitive Angling as a Scientific Tool

Competitive Angling as a Scientific Tool aims to enhance our knowledge of five data deficient species in the Solent: bass, black bream, smoothhound, skates and tope. We are harnessing the power of citizen scientists by collaborating with a catch-photograph-release angling competition (Sea Angling Classic). Anglers submit georeferenced photos of each fish on a measuring board, which provides species, size and catch location data. By combining fish records with GPS trackers we can identify fish hotspots and coldspots. We are also developing an Artificial Intelligence model to identify and measure fish from photos. Replicating our method will provide an easy way of collecting data to study changes over time and therefore inform the development of sustainable fishery management plans.

Biography

Dr Christina Hunt is a Senior Research Associate at the University of Portsmouth. She is currently working on the 'Competitive Angling as a Scientific Tool' project, a partnership between the University of Portsmouth, Angling Spirit and Southern IFCA. The project utilises data collected during the annual 'Sea Angling Classic' competition in the Solent, which is run as a catch-photograph-release competition. The aim of the project is to increase our knowledge of the biology and ecology of fish species that are considered data deficient within the Solent, including European sea bass.

Speaker: Katie St John Glew (Defra)

Abstract: Development of Latest Fisheries Management Plan (FMP)

Katie provides an update on the development of the latest bass FMP.

Biography

Katie is a marine scientist and a fisheries science advisor at the Department for Environment, Food and Rural Affairs (DEFRA). Her research interest is in animal migration, seafood management and sustainability.

