WORKING GROUP ON RECREATIONAL FISHERIES SURVEYS (WGRFS)

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i Executive summary

The ICES Working Group on Recreational Fisheries Surveys (WGRFS) is tasked with compiling and validating data from European marine recreational fisheries (MRF) to support ICES assessment and advisory processes. In 2025, WGRFS undertook a wide range of activities focused on consolidating national survey programs, assessing novel methodologies, and providing guidance on data quality, availability, and use. The increasing importance of MRF in fisheries management is recognized, particularly in the context of the revised EU Fisheries Control Regulation and the implementation of new digital reporting systems.

Key discussions included the development of harmonized protocols for data collection and reporting, notably through the RecFishing IT system, which integrates mobile and web applications for catch reporting and data exchange. The report details the challenges of coordinating data collection across diverse regions and regulatory frameworks, emphasizing the need for standardized methodologies and robust quality assurance. The ICES WGRFS Quality Assurance Toolkit (QAT) was used to assess French and Netherlands national survey programs, ensuring consistency and reliability in catch estimates.

The importance of co-design and engagement was recognized, particularly with the recreational angling community, to improve data quality and management outcomes. Case studies, such as pollack management in the UK, illustrated the complex interplay between scientific evidence, policy decisions, and stakeholder perceptions. The group advocated for multidimensional datasets that encompass biological, socio-economic, and behavioural metrics.

Sessions reviewed the impacts of climate change on species distribution, the integration of MRF data into stock assessments, and the evaluation of post-release mortality and animal welfare. The role of MRF in food safety and human health was assessed, highlighting both risks and nutritional benefits associated with recreationally caught seafood.

In conclusion, the ICES WGRFS 2025 report advances the scientific foundation for MRF management by promoting standardized data collection, stakeholder engagement, and integration of recreational fisheries into broader ecosystem-based management frameworks. This aims to enhance the sustainability, resilience, and societal value of marine recreational fisheries.

ii Expert group information

Expert group name	Working Group on Recreational Fisheries Surveys (WGRFS)
Expert group cycle	Multiannual fixed term
Year cycle started	2022
Reporting year in cycle	3/3
Chairs	Kieran Hyder, UK
	Estanis Mugerza, Spain
Meeting venues and dates	02–06 June 2025, Faro, Portugal (62 participants)

1 Introduction

Working Group on Recreational Fisheries Surveys 2025 report

1.1 Terms of reference[1]

Term of reference	Addressed in this report
a - Collate and review quality of national estimates of recreational catch and effort, catch-and-release impacts, and socio-economic benefits for candidate stocks, identify significant data gaps in coverage and species, and support the ICES TAF and ecosystem approach.	Yes
b - Assess the validity of traditional knowledge, new survey designs, novel methods (e.g. citizen science, apps), innovative statistical methods for data provision, and approaches for selecting appropriate cost-effective methods.	Yes
c - Guide ICES and respond to *ad hoc* requests from ACOM on the availability of data, design of data collection programs, data storage systems, use of data in assessments, catch allocation, and ecosystem approach.	Yes
d - Develop approaches for regional data collection programmes that generate robust data for end-users and support the ICES TAF and ecosystem approach.	Yes
e - Evaluate the use of economic (e.g. impact, valuation), social (e.g. governance, behaviour, welfare, health), and communication (e.g. participatory process, messaging) to support the assessment and management of recreational fisheries.	Yes
f - Review outcomes of the workshops organized by the working group.	Yes

1.2 Summary of the workplan

Year	Work Plan
Year 1	Review progress of intersessional groups (i.e. governance, survey design, quality and analysis, regional coordination, data storage, catch-and-release impacts, novel methods, assessment and catch allocation, human dimensions, and communication) and agree on an approach for the next year. (a, b, c, d, e) Evaluate the quality of up to three national survey programmes using the QAT and provide feedback on tasks requested by ICES. (a, c) Review the outputs from ICES WRGRFS-led workshops and discuss next steps for the inclusion of outcomes. (f) Scope data call for ICES based on the formats developed by WGRFS and the RDBES core group. (c, d, f) Assess priorities for including recreational fisheries in stock assessments using data from the pilot studies. (a, c, d) Develop an ICES workshop proposal with WGCATCH for integrating probabilistic and non-probabilistic surveys. (b) Create an ICES workshop proposal to evaluate post-release mortality estimates, potential sublethal effects, and reasonable extrapolations across species and fisheries for inclusion in stock assessments. (a)

[1] The full ToRs can also be found in Annex 2.

Year	Work Plan
	Assess the potential for food safety and human health issues from consumption of recreational caught fish (e.g. environmental toxins). (e)
	Review and share methods for engaging with interested parties and the potential for participatory approaches. (e)
	Draft a roadmap to increase the inclusion of recreational fisheries data into advisory processes. (c)
Year 2	Evaluate the outcomes from the intersessional work and agree approach for the next year. (a, b, c, d, e, f)
	Review national programmes, including assessment of quality of up to three programmes and provide feedback on tasks requested by ICES. (a)
	Assess the potential of novel survey methods to deliver recreational fisheries data (e.g. citizen science approaches, smartphone apps, traditional knowledge). (b)
	Develop a framework for allocation of catches between sectors based on a review of existing systems and provide best-practice guidance. (c, d)
	Develop MSE approaches to assess the impact of uncertainty in recreational catches on assessment and regional sampling programme. (d).
	Review and share methods for engaging with interested parties and the potential for participatory approaches. (e)
	Assess outcomes of workshop on inclusion of recreational data in stock assessments. (f)
	Assess the potential for food safety and human health issues from consumption of recreational caught fish (e.g. environmental toxins). (e)
Year 3	Review progress of intersessional groups (i.e. governance, survey design, quality and analysis, regional coordination, data storage, catch-and-release impacts, novel methods, assessment and catch allocation, human dimensions, and communication) and agree on an approach for the next year. (a, b, c, d, e)
	Evaluate the quality of up to three national survey programmes using the QAT and provide feedback on tasks requested by ICES. (a, c)
	Review the outputs from ICES WRGRFS-led workshops and discuss next steps for the inclusion of outcomes. (f)
	Collate advances in survey methods that could be used to improve national approaches. (b)
	Assess the potential for impact of climate change on species caught by recreational fisheries and how that could impact DCF and regional species requirements. (c, d)
	Develop an ICES workshop proposal on MSE approaches to assess the impact of uncertainty in recreational catches on assessment and regional sampling programmes. (d).
	Assess the potential of novel survey methods to deliver recreational fisheries data (e.g. citizen science approaches, smartphone apps, traditional knowledge). (b)
	Evaluate progress against the three-year plan and develop new ToRs. (a, b, c, d, e, f)

2 Progress report on terms of reference and work-plan

2.1 Country updates (ToR a)

Recreational fishing is a popular activity across the globe, with surveys carried out to assess participation, catch, economics, and social benefits (Hyder *et al*., 2018). Recreational fishing is defined by WGRFS (ICES, 2013) as:

> **"Recreational fishing is the capture or attempted capture of living aquatic resources mainly for leisure and/or personal consumption. This covers active fishing methods including line, spear, and hand–gathering and passive fishing methods including nets, traps, pots, and set–lines".**

Country updates were presented for France, Italy, Spain, and the UK.

2.2 Perspectives from end-users

2.2.1 European Commission update

DG MARE: Joana Patricio, Leonie O'Dowd, Bianca Wiles, Cannelle Beauchesne, and Martin Chemnitz Mortensen

DG MARE provided an update on: the Common Fisheries Policy (CFP), and evaluation of the CFP regulation; measures on recreational fisheries by sea basin (EU Atlantic Waters, Baltic Sea and Mediterranean); the new Commission Implementing Regulation (EU) 2025/274 and RecFishing progress; and data collection.

2.2.1.1 The Common Fisheries Policy – evaluation of the CFP regulation

DG MARE highlighted that the evaluation would provide an evidence-based assessment of whether the CFP Regulation is still fit for purpose and where improvements could be made. The evaluation follows the Better Regulation Guidelines[2]: effectiveness; efficiency; relevance; coherence; and EU added value. The political context for the evaluation is the guidelines for the Commission (2024–2029)[3] and the mission letter and hearing for Commissioner Kadis[4]. This includes a long-term vision for a resilient, competitive, and sustainable fisheries and aquaculture sectors in a 2040 perspective. Furthermore, a European Ocean Pact[5] ensures coherence across all policy areas linked to the oceans. The final product of the evaluation will be a European Commission staff working document in spring 2026. The evaluation findings will feed into the next steps of the decision-making cycle. As part of the process, a call for evidence ran in 2024 and a public

[2] https://commission.europa.eu/law/law-making-process/better-regulation/better-regulation-guidelines-and-toolbox_en

[3] https://commission.europa.eu/document/download/e6cd4328-673c-4e7a-8683-f63ffb2cf648_en?filename=Political%20Guidelines%202024-2029_EN.pdf

[4] https://commission.europa.eu/document/028ce7d5-e328-4416-8f0d-35c8884acaa8_en

[5] https://oceans-and-fisheries.ec.europa.eu/european-ocean-pact_en

consultation in early 2025. During the public consultation, the Commission received 362 responses from a wide range of respondents and nationalities.

2.2.1.2 Measures on MRF by sea basin

For the EU Atlantic Waters and the Baltic Sea, the Commission highlighted that MRF catches of certain stocks can be comparable to commercial catches and have an impact on the stocks' biomass, which highlights the importance of regulation and catch limits for MRF in some cases (e.g. stocks with zero catch advice). Such measures can include: prohibition of recreational catches; bag limits; catch and release; combined limit for total commercial and recreational catches; prohibition of certain gears; and closed areas and/or seasons. Some exceptions may be allowed, for example, retaining incidental bycatch. The Commission provided an overview of measures in 2025 for the Baltic Sea and EU Atlantic waters[6].

For the Mediterranean, the Commission highlighted that in November 2022, the General Fisheries Commission for the Mediterranean (GFCM) was the first RFMO to adopt dedicated management measures and minimum standards for the management of MRF with the adoption of Recommendation GFCM/45/2022/12. For MRF, the GFCM has introduced a set of horizontal measures (e.g. technical measures, control measures, a list of priority and prohibited species, and prohibited areas); and had a kick-off meeting in February 2025 of the two-year GFCM research recreational fisheries research programme aiming to close knowledge gaps on recreational fisheries and identify potential management measures for the future.

2.2.1.3 Commission Implementing Regulation (EU) 2025/274 and RecFishing progress

DG MARE presented developments on the implementation of Article 55 of the revised Fisheries Control Regulation (Regulation (EU) 2023/2842)[7] and the new Commission Implementing Regulation (EU) 2025/274[8] establishing detailed rules for recreational fisheries data collection and reporting. The Commission explained the rationale for having new rules that will generate additional recreational fisheries data across the EU. Better data are needed to ensure conservation, management and sustainable exploitation of marine biological resources in the long term.

The presentation outlined the main provisions of the new Implementing Regulation, which will apply from 10 January 2026, covering:

- The submission of catch data by Member States to the Commission for species under Articles 55(2) and 55(3) of the revised Control Regulation, including date of submission.
- The categories of fishing modes, gears, and geographical breakdowns to be used in monthly and annual reporting.
- The marking of passive gear used in recreational fisheries.

DG MARE emphasized that the legal framework aims to ensure harmonized minimum standards across the EU while accommodating national specificities. The process has been highly collaborative, involving close consultation with Member States, the scientific community, and interested parties through the Working Group on Recreational Fisheries (WGRF).

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[6] Examples of measures are cod in subdivisions 22 to 32, salmon in subdivisions 22 to 31, seabass ICES divisions 8a and 8b, pollack in subareas 8, 9 and 10 and Union waters of CECAF 34.1.1, and eel in EU Atlantic waters.

[7] Regulation - EU - 2023/2842 - EN - EUR-Lex Regulation (EU) 2023/2842 of the European Parliament and of the Council of 22 November 2023 amending Council Regulation (EC) No 1224/2009, and amending Council Regulations (EC) No 1967/2006 and (EC) No 1005/2008 and Regulations (EU) 2016/1139, (EU) 2017/2403 and (EU) 2019/473 of the European Parliament and of the Council as regards fisheries control

[8] Commission Implementing Regulation (EU) 2025/274 of 12 February 2025 laying down detailed rules for the application of Article 55 of Council Regulation (EC) No 1224/2009 on the control of recreational fisheries

A preliminary list of species and stocks subject to Articles 55(2) and 55(3) was presented, including key species such as European sea bass, pollack, eel, cod, tuna, and swordfish. DG MARE underlined that these lists were compiled for 2025 only, remain indicative and will be adjusted following the TAQ and Quota negotiations with the Council.

The Commission also highlighted ongoing technical work to support the operationalization of the IT system:

- Establishing species length–weight relationships, to convert length-based information provided by fishers into accurate weight estimations.
- Defining the variables to be used to characterize aggregated length and finalize the API for the submission of aggregated catch data, for those species for which length is considered relevant.
- Setting up task forces to consolidate scientific input and agree on the approaches to follow by mid-2025.

The RecFishing IT system is the EU-wide digital infrastructure being developed to collect and manage recreational fisheries data at the EU level. This modular system comprises three main elements:

- The Fishers mobile app for individual fishers' registration and catch reporting.
- The RecFishing web app for Member State authorities to access and transmit aggregated data.
- APIs enabling data exchange between national systems and the EU central server.

Testing of these components will occur during summer–autumn 2025, involving both internal/COM and Member State users. DG MARE stressed the importance of active Member State engagement to ensure readiness ahead of the system's legal go-live in January 2026.

2.2.1.4 Data collection

A short recap was provided on the Data Collection Framework (DCF) requirements arising from the EUMAP[9]. Regular sampling on recreational fisheries is compulsory (no more pilot studies), with emphasis on multispecies sampling schemes. There is a minimum list of species published per sea basin, but the selection of species should be based on end-user needs and agreed at the regional level. Biological data should be collected where recreational fisheries affect stock development. In the EUMAP, there is a strengthening of the regional coordination, following the overall regionalisation principle in the CFP. Annual reports relating to the implementation of EUMAP are from 2022 to 2024, and an ICES WGRFS data call was launched to receive collected data. The use of the data transmission issue tool needs to be further explored with ICES, DGMARE and the expert group. On the new workplans, DG MARE informed WGRFS that all Member States submitted updated NWPs in October 2024 for 2025–2027, which were evaluated by STECF and the Commission and adopted. New elements included: updates to their NWPs; incorporation of national commitments arising from the new regional work plans; and actions arising from the Marine Action Plan (improved bycatch monitoring), which also refers to improved bycatch monitoring from recreational vessels. For any information on the evaluation results on recreational fisheries, WGRFS was invited to review the Annexes for STECF evaluation grid STECF EWG 24-15, with details of the recreational sampling schemes in Annex 1.1. Finally,

[9] Commission Delegated Decision (EU) 2021/1167 of 27 April 2021 establishing the multiannual Union programme for the collection and management of biological environmental, technical and socioeconomic data in the fisheries and aquaculture sectors from 2022 and Commission Implementing Decision (EU) 2021/1168 of 27 April 2021 establishing the list of mandatory surveys and thresholds as part of the multiannual Union programme for the collection and management of data in the fisheries and aquaculture sectors from 2022.

DG MARE provided an update on the regional coordination by the RCGs. Here, all RCGs submitted their first RWPs in 2023 to be incorporated into NWPs 2025–2027.

The RCG Med & BS will meet 25–29 August 2025 and follow methodologies described in the "Handbook for data collection on recreational fisheries in the Mediterranean and the Black Sea" (Grati *et al*., 2021). The 2025–2027 Regional Work Plan includes: (i) estimating the population of recreational fishers by segment (fishing gear-technique, e.g. shore, boat, spear fishing, etc.) and subregion; (ii) apply multispecies approach and collect data from off-site surveys using standardized protocols; and (iii) apply on-site surveys (non-binding) using standardized protocols. Member States (MS) are invited to propose a list of vulnerable species caught in MRF and compile a list for each subregion. To facilitate this process and set minimum standards, standardized protocols for performing the off-site survey (questionnaire to be used in a telephone survey) and on-site survey (questionnaire to be used in face-to-face interviews) must be considered as templates, and each MS can modify/adapt them according to specific needs.

The RCG North Atlantic, North Sea and Eastern Arctic and RCG Baltic has agreed: to include a test study on Northern sea bass (*Dicentrarchus labrax*) for marine recreational fisheries sampling for 2025–2027 in the regional Work Plan; to incorporate MRF data in the Regional Data Base Estimation System (RDBES); and to follow the recommendation for multispecies sampling, but is also discussing species list. In 2024, the ISSG RF reported back on potential candidate species for regional sampling plans, (western Baltic cod, Baltic salmon, northern shelf cod, pollack, northern sea bass, blue marlin, bluefin tuna, bigeye tuna, albacore, yellowfin tuna, blackspot sea bream, southern sea bass, white sea bream, red porgy, thornback ray, dusky grouper and Mediterranean parrot fish). The ISSG is working on development of regional sampling plans to be finalized in 2026 for RWPs 2028–2030.

The RCG Large Pelagic fisheries meets in June 2025. No recreational fisheries are incorporated into their RWP, any EU recreational fisheries on large pelagics fall under this RCG.

Regarding the regional sampling plans, WGRFS discussed the challenges to coordinate data collection across different regions and countries due to different legislations and the RF sectors not being homogeneous. The group felt it would be extremely difficult to have a regional sampling plan and funding is a challenge, so should be discussed at the RCGs.

2.2.2 Regional Coordination Groups (RCGs)

The work done by the RCG NANSEA & Baltic Inter Sessional Sub-Group on Recreational Fisheries (ISSG-Recreational) was summarized. This subgroup has focused on developing Regional Work Plans for 2024–2025, identifying candidate species, cataloguing data collection methods by MS, assessing survey design and quality, and defining priority species lists using a PSA (Productivity-Susceptibility Analysis). Collaboration has been ongoing and/or planned with the European Commission, ICES WGRFS, other RCGs, and ICCAT. The annual meeting of this ISSG was held online in March 2025.

Only candidate RWPs have been identified so far, with the list including western Baltic cod, Baltic salmon, North Sea cod, North Sea pollack, northern sea bass, blue marlin, BFT, sharks and rays. Dedicated groups have been set up for bluefin tuna and Iberian sparids involving experts from multiple countries. A template for MRF workplans is being developed focusing on species, regions, data collection methods, coordination, data needs, quality control, and end-users. The next step is to evaluate entries submitted by MS in autumn 2025.

Significant progress has been made in implementing Control Regulation 2023/2842. Mandatory registration and electronic daily reporting for recreational catches will be required for certain species from January 2026, expanding to additional species by 2030. MS have chosen between

national and EU data systems, with 10 opting for the EU system and 12 developing their own. Regarding the EU system development and implementation, one of the co-chairs of this ISSG is also involved in the *ad hoc* Working Group on Recreational Fisheries from the Commission. Monthly data submission to the Commission will begin in July 2025, supported by the development of the RecFishing app, which will be available for testing in September 2025. ISSG is actively involved in implementing Article 55, including task forces on aggregated length and length-weight relationship data. The species list for mandatory reporting is being refined using PSA and will be finalized later this year. The ISSG rises the need of angler information awareness campaigns.

The integration of MRF into assessments was tested in WGBFAS for Baltic Sea plaice. Only German data are available, as there are no surveys that include plaice for Sweden or Denmark. Thus, formal integration has been postponed to the next benchmark. New insights into stock components, such as North Sea cod and Western Baltic cod, may require adaptations to data collection schemes and sampling frames to support more detailed management.

Outreach has been extended to other RCGs, including Mediterranean & Black Sea, RCG Large Pelagics (LP), ISSG-Diadromous, this WGRFS, and ICCAT. The species list is being flagged to these groups, and social indicators are being addressed through indirect contact with STECF, WGSOCIAL, RCG ECON, and DG MARE.

The main challenge for ISSG Recreational remains the coordination of data collection across regions and countries with varying survey methods and regulations in place. Liaising with other groups is essential but time-consuming.

2.2.3 Recreational fishing community

Lead: Hannah Rudd and David Vertegaal

2.2.3.1 European perspective

Over the last 10 years, the MRF sector has seen the introduction of catch limits in the form of individual bag limits and closed seasons, generally applied for stocks that require rebuilding and extra protection. This justification is important to get buy-in of the recreational fisheries community. However, it is also important for the CFP to deliver parity in fishing opportunity for MRF with the other CFP stakeholders (i.e. large- and small-scale commercial fisheries).

MRF will have a paradigm shift in 2026, with participants confronted by mandatory data collection through registration and catch declaration. Acceptance of registrations by MRF depends upon a fair justification where, when, and why this is necessary. To answer this question, considerations would have to be:

- What is the impact of the sector on the stock and it associated uncertainty?
- What is the status of the stock and it associated uncertainty?
- What is the value of the activity and where is it generated?

The outcomes for MRF, including assessment of validity of the data, should be judged in the context of data generated for other CFP stakeholders. This will allow fair management, accounting for CFP goals such as Article 17: to allocate catch opportunities based upon a sectors' environmental impact and socio-economic value.

One concern is data quality, as it can be poor and it is questionable if it is robust enough to ensure fair management. Participation by users in research is often low and response burden results in high levels of dropouts and removal of data due to scientific quality issues. Raising to a country level may give rise to serious over- or underestimation, with policy determined by these outcomes. The EAA supports data quality improvement by advocating for increased participation

in conventional methods such as surveys and logbooks. The EAA also supports catch apps as a general principle to generate data, but is critical of the current EU mandatory approach as it is unlikely to yield robust data soon. The EAA fully expects the recreational sector to remain reliant on conventional surveys rather than mandatory approaches for robust high-quality data.

It is important to recognize the difference in characteristics between subsectors of MRF (e.g. angling, spears, nets, pots, traps). Selectivity and post release mortality of angling compared to gillnet fishing is one good example. The EAA supports inclusion of distinct subsector definitions in Article 55 of the Control Regulation. In addition to definitions, the EAA believes it is vital that specific MRF management goals and tools are embedded in the CFP. MRF management should not only be about restricting catches, but it should also support sectoral development increasing the valuable contribution that MRF makes to economy particularly in coastal communities. One approach would be to consider alternatives to MSY (e.g. MEY) for stocks with a high value to the MRF. This could also be used to produce stocks that are more resilient to climate change and have a more natural stock structure.

In addition to better data quality, sector specific goals could prevent 'over management' that result in avoidable and unwanted harm. A good example is management measures implemented for MRF in the Baltic to protect cod. While measures were needed, the effect of the measures was to reduce angling by 75%, which was far higher than the 25% intended causing unnecessary damage to the angling sector.

MRF generates significant economic benefits in coastal communities, offering vital opportunities for diversification in communities hit hard by reductions in fleet capacity or shifts in stock presence due to climate effects. MRF operate throughout the year, often generating income outside traditional tourist seasons. To quantify such opportunities, it would be useful to create MRF dependence indices, similar to those for commercial fisheries.

There is increasing pressure to decouple environmental from fisheries impacts to protect our environment. MRF shares the characteristic of many small-scale fisheries, in that it combines a high socio-economic value for coastal communities with a low environmental impact. Co-use of marine protected areas (MPAs) is not a 'no' by definition. Depending on site-specific protection objectives, co-use and protection can work harmoniously. This would provide local knowledge and eyes and ears where strict closures may harm acceptance.

If the MRF sector wants to be fully included in the CFP it would be helpful to be very clear on the why – what does this sector expects to gain from full inclusion? The EAA welcomes this advice received from the Commission and will act on it. The EAA recognizes that three fisheries Advisory Councils have shown explicit support for such an inclusion of MRF, but a reform of the CFP is needed for it to happen.

2.2.3.2 UK perspective

The Angling Trust provided an overview of interested party perceptions surrounding MRF data collection in the UK. "Trust, Tension, and Tackle Boxes" examined the evolving relationship between the recreational angling community and fisheries science, highlighting the central role of trust, communication, and participatory approaches in improving data quality and fisheries management outcomes.

2.2.3.2.1 MRF data collection

Marine recreational fisheries in the UK represent a significant and growing component of national fisheries activity. Recent estimates suggest that over 750 000 individuals participate in marine recreational angling annually, contributing approximately £1.5 billion to the UK economy and targeting over 100 marine species across coastal and offshore waters. Despite this scale, MRF remains unlicensed and largely unmonitored, creating persistent challenges for evidence-based

management and limiting the integration of recreational data into stock assessments and policy processes.

The Angling Trust, as the National Governing Body for recreational angling in England, has been a leading advocate for more comprehensive and inclusive data collection frameworks. This has become increasingly important since the formal recognition of recreational fishing under the UK Fisheries Act (2020), which established a legal foundation for incorporating MRF considerations into sustainable fisheries management. However, current data collection programmes in the UK primarily focus on catch and effort statistics. This narrow focus often overlooks the wider social, cultural, and economic dimensions of recreational fisheries, including their role in coastal livelihoods, tourism, wellbeing, and environmental stewardship. During WGRFS, the Angling Trust underscored the importance of developing multidimensional datasets that reflect not only biological metrics, but also the socio-economic and behavioural dynamics of the sector.

Without adequate spatial, temporal, and species-specific data, alongside a robust understanding of the sectors socio-economic significance and human dimensions, both the resilience of fish stocks and the sustainability of recreational fisheries may be compromised. Addressing these gaps requires co-production of knowledge between scientists, policymakers, and anglers, underpinned by trust and mutual understanding.

2.2.3.2.2 Barriers to participation and trust

Several structural and perceptual barriers continue to limit angler participation in data collection initiatives. The Angling Trust identified the following key issues:

- Distrust towards government and scientific institutions, often linked to concerns about how data will be interpreted or used in regulation.
- Fear of restrictive measures, with many anglers believing that participation in data collection may lead to reduced access, tighter catch limits, or site closures.
- Lack of feedback and transparency, as anglers rarely receive information on how their contributions influence policy or management outcomes.
- Survey fatigue, privacy concerns, and unclear value propositions reduce motivation to participate in repeated or complex data-gathering exercises.

These factors collectively contribute to low engagement rates and variable data reliability. The perception that recreational anglers are underrepresented or unfairly targeted in management decisions further erodes trust and cooperation. Rebuilding confidence, therefore, depends on demonstrating that data are used constructively to protect both fisheries and fishing opportunities, rather than to impose additional restrictions.

2.2.3.2.3 Case study: pollack management

A case study on pollack (*Pollachius pollachius*) management in 2024 provides a practical example of how these issues manifest in real-world policy contexts. Following the introduction of a zero Total Allowable Catch (TAC) for pollack in the English Channel and Celtic Sea, implemented in response to scientific advice indicating stock depletion, the Angling Trust conducted a self-selecting survey of 431 recreational anglers, including charter, to better understand interested party perceptions.

Survey responses revealed diverse motivations among participants, ranging from subsistence and sport fishing to conservation and stewardship interests. However, there was broad consensus around several key themes:

- The need for science-based regulation that applies equitably across commercial and recreational sectors.
- Economic concerns regarding the viability of charter boat operations and angling-related tourism.

- Calls for compensation or mitigation schemes comparable to those offered to commercial fishers.
- Recognition of ecological pressures, including predation by growing seal populations.

The pollack case study illustrated the complex interplay between biological evidence, policy decisions, and interested party perceptions. It demonstrated that management measures lacking effective communication and co-design risk generating tension and eroding compliance, even when grounded in robust science.

2.2.3.2.4 Interested party engagement and communication

Enhanced stakeholder engagement and communication were identified as critical components for improving the effectiveness of MRF data collection. The Angling Trust highlighted several guiding principles:

- Early involvement of anglers in survey design to ensure relevance and buy-in.
- Clear and consistent messaging about the purpose of data collection and how information will be used.
- Utilization of trusted messengers, including angling clubs, charter skippers, tackle retailers, and social media influencers, to improve outreach and legitimacy.
- Establishment of feedback loops to demonstrate how angler input directly informs management decisions or scientific outputs.
- Development of user-friendly tools (e.g. mobile applications) and incentive mechanisms (e.g. recognition schemes, competitions) to reduce barriers to participation.

Reframing data collection to safeguard access, support sustainable management, and evidence of socio-economic value can help shift perceptions from suspicion to shared ownership.

2.2.3.2.5 Key messages

The Angling Trust concluded that anglers increasingly wish to be recognized as informed and responsible stakeholders within the broader fisheries management community. Building mutual trust between the recreational sector, scientists, and decision-makers is essential to strengthening data quality and ensuring that policy measures are both ecologically sound and socially equitable. As recreational fisheries become more embedded within management frameworks at national and regional levels in the UK and the EU, it is crucial that monitoring extends beyond catch and effort to encompass social, economic, and cultural metrics. Integrating these dimensions will allow a more holistic, ecosystem-based approach to fisheries management, ensuring that the recreational fishing community continues to contribute positively to marine sustainability, coastal economies, and public engagement with the marine environment.

2.2.4 Food and Agriculture Organization of the United Nations (FAO)

Lead: James Geehan

The FAO collects, manages, and disseminates global capture and aquaculture production statistics for inland and marine environments, including retained catches from inland and marine recreational fisheries (Sharma *et al.*, 2025).

FAO's fisheries and aquaculture statistics are compiled primarily from official country submissions, along with data disseminated by regional fisheries bodies and other alternative sources to supplement estimates for countries that do not report. The datasets cover global capture fisheries and aquaculture production (since 1950), aquatic trade, fishing fleets, and employment. Dissemination tools include FishStat software, online query tools, and statistical yearbooks, with data available in CSV format for analysis (https://www.fao.org/fishery/en/topic/166235).

The core of FAO's data collection for capture statistics is the NS-1 questionnaire, which requests annual retained catches (landings) by species item and FAO Major Fishing Area from over 240 countries and territories. While countries are requested to report landings for all fisheries, including small-scale or artisanal fisheries, industrial, recreational, and subsistence fisheries, data are not disaggregated by fisheries sector. Discards are not included, and no information on gear type is collected.

A significant challenge is non-response or incomplete reporting by some countries, especially for inland waters and recreational fisheries. Many catches are reported at varying levels of species aggregation (e.g. "tuna-like fishes nei", "marine water fishes nei"), and the proportion of such aggregated data are particularly high for inland waters. Underestimation of retained catches for small-scale fisheries and sectors such as subsistence and recreational fisheries are persistent problems, while abrupt changes in the time-series in official data (e.g. because of changes or improvements in the data collection) are common and can confound the assessment of long-term trends in landings.

For inland waters, the FAO collects commercial and recreational retained catches separately on behalf of EIFAAC via the FISHSTAT-IW questionnaire. Reporting gaps also persist among EIFAAC members, often due to data collection difficulties or outdated contacts.

There is an opportunity for the ICES WGRFS to collaborate with the FAO to improve the reporting of recreational fisheries data. The first stage would be for ICES to present to the FAO Coordinating Working Party on Fisheries Statistics (CWP) and for WGRFS to support the development of a joint questionnaire with FAO to distribute to Member Countries that aims to better understand the MRF sector, governance, data collection, and licensing.

2.3 Inclusion in ICES advisory processes

2.3.1 Inclusion of MRF in stock assessment

Lead: Kieran Hyder

Integration of marine recreational fisheries (MRF) data into ICES stock assessments and advice is becoming more common. For example, the 2025 DG MARE grant agreement with ICES states:

"*When recreational fisheries take a significant part of the catches, the advice shall indicate this, and the catch scenarios table shall, when the assessment conducted by ICES allows this, also include: (i) total catches in commercial and recreational fisheries; (ii) catches in respectively commercial and recreational fisheries; and (iii) landings and discards in respectively commercial and recreational fisheries. In addition, ICES will incorporate, where possible, in its stock assessments recreational fisheries management measures agreed which are made known to ICES, following a request for information of ICES to DG MARE (e.g. for sea bass in ICES divisions 8a and 8b).*"

This, alongside the increasing recognition of the importance of MRF by ICES, has resulted in several activities to address this gap including: development of an MRF roadmap; a workshop about integrating MRF in stock assessment; approaches for synthesising data for inclusion in specific stock assessment (e.g. sea bass, pollack); changes to advice sheets to include MRF; prioritization of species for MRF inclusion in stock assessment; and inclusion in MRF in data calls for assessment groups.

ICES has produced a roadmap for MRF integration in ICES stock assessments and advice (ICES, 2024a). At the heart of the roadmap is the **DAISY** model: **D**ata must be robust and accessible; an agreed and consistent approach should be used for MRF **A**dvice; **I**ntegration of MRF into assessment is needed; **S**cience is required to meet future needs; and these steps must be implemented

Yearly within the annual advice cycle. Twelve recommendations area made to integrate MRF in ICEs advice.

A workshop was held to consider how best to integrate MRF in stock assessment (ICES, 2024b). This highlighted the obstacles to inclusion, which were often around the quality and quantity of data. Flow charts were developed based on the assessment approach, data quality, and proportion of the catch. It was important to prioritize species for inclusion, communicate the need to include MRF, and identify resource to support integration.

Synthesis of MRF data for inclusion in assessments is complex due to the variety of approaches, time-scales, coverage, and bias. It involves constructing time-series of retained and released catches alongside length–frequency distributions. Post-release mortality estimates are only available for a limited number of species, so effects are underway to do a global review and generate generic estimates that could be used in the absence of species or fishery estimates. Catch reconstruction of historical time-series require making assumptions about the fishery and are likely to vary between stocks. Examples were presented for sea bass, pollack and whiting. A PSA is underway to prioritize species for inclusion in stock assessment across Europe (see Section 2.4.6).

2.3.2 Data calls and benchmarks

Leads: Lara Salvany and Jan De Haes

Benchmarks are the main route through which marine recreational fisheries (MRF) data can be incorporated into ICES stock assessments and advice products, as they provide the formal mechanism for peer reviewing and integrating new science and types of data into the annual assessment work carried out by ICES assessment working groups (e.g. WGBFAS, WGBIE, WGNSSK, WGCSE, etc.). The majority of benchmarks relate to recurrent advice on single-stock fishing opportunities, and since recreational fishing can influence fishing mortality and dynamics of certain stocks, it is important that WGRFS engages effectively in ICES benchmarks and splits this effort across members of the group.

ACOM holds ultimate responsibility for ICES benchmark processes and acts on recommendations from the Benchmark Oversight Group (BOG), which is a subgroup of ACOM with representation from both ACOM and SCICOM. BOG is responsible for (1) prioritising benchmark proposals (usually submitted by stock assessment experts or assessment working groups themselves), (2) organizing priority stocks into benchmark processes[10], and (3) evaluating the benchmark results and making recommendations to ACOM for final approval. Through this workflow, newly benchmarked methods and data sources become the agreed technical basis for recurrent ICES advice. Figure 1 provides a stylized indication of an ICES benchmark process.

Benchmark processes formally start with a data workshop and conclude with a benchmark assessment workshop; however, substantial preparatory work precedes these stages, particularly the design and development of the data call. Data calls are a critical entry point for the involvement of recreational fisheries experts in benchmark processes since participation by WGRFS members in contributing to the design of the data call is the only way to ensure MRF data are made available for benchmarks and, by extension, annual assessment working groups. Participation by WGRFS members in the design of data calls and benchmark data workshops allows issues related to survey design, bias correction, uncertainty estimation, and data suitability to be addressed at the outset rather than being considered retrospectively during the assessment work.

[10] At this point, ICES Secretariat takes over benchmark coordination: i.e. organizing meeting dates, chairs, reviewers, etc.

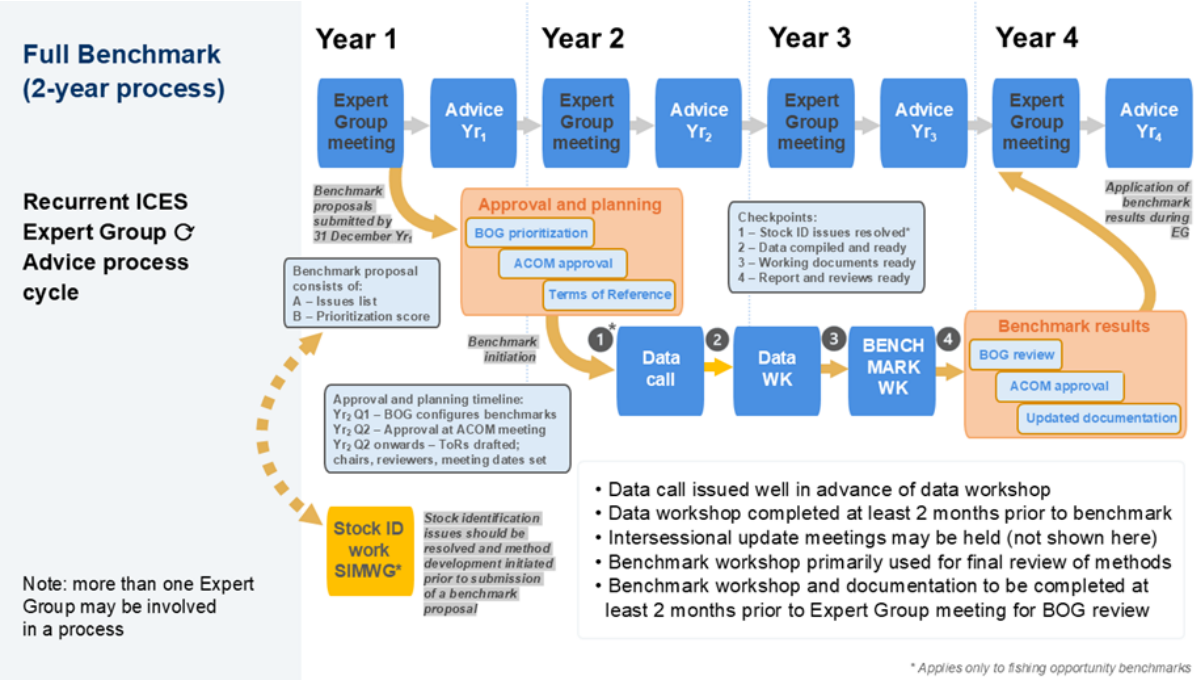

Figure 1. Stylized flowchart of a benchmark process (Source: ICES Guidelines for Benchmarks).

WGRFS discussed the need to proactively identify stocks for which recreational catches are relevant, and to ensure that at least one representative with MRF expertise participates in the corresponding benchmark processes. Strengthening dialogue between WGRFS and BOG was identified as a priority for better integration of MRF data due to the complexity and extended nature of benchmark timelines, data call schedules, and WGRFS meeting cycles. The annual timetable of ICES assessment working groups presents additional challenges for MRF data integration, as finalized data are typically required in February–March, while many national recreational fisheries surveys are completed later in the year. Improved communication and extended planning timelines are hoped to strengthen the effective participation of WGRFS in ICES benchmarks. WGRFS decided at the 2025 meeting that at least one MRF specialist should participate from the outset in benchmark processes for stocks where recreational fisheries are relevant.

Full guidance on ICES data calls and benchmark processes is available from the ICES library[11,12]. The latest information on active benchmark processes can be found on the ICES benchmarks landing page on the ICES website[13].

2.4 Intersessional groups (ToRs a–e)

The ICES WGRFS encompasses a broad spectrum of specialised topics demanding expert insight and in-depth exploration. Given the time constraints of annual meetings, the ICES WGRFS has opted to institute nine intersessional groups. These cover governance, survey methods, quality assessment of surveys, regional coordination and data storage; catch and release and fish welfare; stock assessment and reconstruction; novel methods; human dimensions; and

[11] ICES. 2025. Data Call Guidelines. ICES Guidelines and Policies - Data. https://doi.org/10.17895/ices.pub.28163492

[12] ICES. 2023. ICES Guidelines for Benchmarks. ICES Guidelines and Policies - Advice Technical Guidelines. https://doi.org/10.17895/ices.pub.22316743

[13] https://www.ices.dk/about-ices/how-we-work/pages/benchmarks.aspx

communications and engagement. Comprising WGRFS members and select experts, these groups convene regularly to tackle agreed objectives. Each group is overseen by two WGRFS members responsible for updating the WGRFS on their progress. A summary detailing achievements and discussions within each group is provided below.

2.4.1 Governance

Leads: Fabio Grati and Kieran Hyder

The ISG focused on four topics: moving towards world class recreational fisheries governance; implementation of the new Control Regulations; social and economic data collection; and bycatch.

A recent study highlighted the need for effective governance of marine recreational fisheries (MRF) in Europe to maximize societal benefits (Grati *et al*., 2025) based on a combination of existing frameworks (Arlinghaus *et al*., 2019; Potts *et al*., 2020). The authors outline ten key issues for European MRF governance: legal definition, policy goals, sectoral acknowledgement, allocation frameworks, co-management, monitoring, cost recovery, compliance, adaptive planning, and multilevel governance. The current state of EU MRF governance is often fragmented, unclear, or inconsistent, which contrasted to a vision for the future that includes clear definitions, embedded policy goals in the Common Fisheries Policy (CFP), transparent resource allocation, inclusive co-management, holistic data collection, standardized licensing, improved compliance, climate-adaptive planning, and regional governance frameworks (Table 1).

The discussion aimed to understand how the ICES WGRFS can support the implementation of world class recreational fisheries monitoring in the EU, including what is possible to move forwards and next steps for the WGRFS (Table 1).

Table 1. Vision for the future of EU governance reproduced from Grati *et al*. (2025) alongside options for the ICES WGRFS supporting a move towards world class recreational governance. Green indicates something that is possible now and WGRFS can support, amber something that is challenging but WGRFS can influence the debate, and red is something that outside WGRFS influence.

Measure	A vision for the future	Moving forward	WGRFS next steps
Legal definition	In addition to the MRF definition, clear definitions are provided for each of the main fishing modes.	Build on the sub-sectors in control regs to generate clear definitions.	Utilize FAO, EU, and other sources to generate WGRFS sectoral definitions and gears that are recreational.
Policy goal	MRF to be fully embedded in the next revision of the CFP alongside policy goals.	Needs revision of CFP before can be developed.	Need to influence the discussion. This should focus initially on highlighting the need for multiple goals to support MRF and work with interested parties to define what embedding of MRF in CFP means practically. These outcomes can be feed in through focused stakeholder groups and core consultation.
Sectoral acknowledgement	Socio-economic importance and societal relevance of MRF is clearly stated in the CFP.	Develop social indicators for MRF to allow benefits to be understood and tracked.	Work with other ICES groups (e.g. WGSOCIAL, WGECON) to integrate MRF in wider thinking about fisheries social and economic indicators.

Measure	A vision for the future	Moving forward	WGRFS next steps
Allocation framework	Allocation mechanism in the CFP that explicitly ensures the fair and equitable distribution of fishery resources between commercial and recreational fisheries.	Need to understand what society wants from fish and how this might be used by policy-makers to inform decisions in a transparent manner.	This is research activity that requires further discussion at the next WGRFS.
Co-management	Clear and transparent co-management processes are in place that include all stakeholders throughout the process. Capacity building could be necessary for the recreational fisheries representatives.	Support co-design processes building on examples from other parts of the world. Capacity building could be supported by sectoral grants.	Mechanisms already in place some parts of the world. For example, the UK FMP process and EU Advisory Groups. However, unclear if this represents true co-design and the power of different actors in decision-making varies. WGRFS could assess how interested parties are engaged in decision-making processes.
Biological, economic and social monitoring	A holistic data collection programme for MRF is included in the EU MAP covering biological, economic, and social monitoring.	Develop ideas for inclusion in EU-MAP revision and Control Regs including social and economic data, and priority species lists.	Develop priority species lists in collaboration with the RCGs, and support discussion about inclusion of social and economic data in DCF and Control Regs.
Cost recovery	Licences in place in all MS for MRF, with funds generated used to support research, develop the sector, and improve access. Policy should clearly articulate how the funds generated should be allocated and utilized.	MS responsibility – most will have lists, but charging for licences is unclear.	Understand the flow of licence money globally and how countries that ring fence funds developed that approach.
Compliance	Good governance principles and transparent stakeholder involvement foster compliance with MRF regulations. Publicity is developed with the angling community to increase knowledge of management.	Improve understanding of compliance through baseline studies and effectiveness of voluntary and mandatory interventions.	Develop workstream around compliance including methods and global review to understand the landscape. Then test approaches within DCF programmes to assess compliance.
Adaptive planning	Horizon scans are done to identify new opportunities for MRF and any associated issues relating to fisher behaviour due to changing climate.	Climate impacts on MRF are better understood allowing for more effective decisions.	Develop climate risk, mitigation and adaptation assessment for MRF across Europe using IPCC approach.
Multilevel governance	Establishment of a regional framework with institutional structures that support MRF governance. Reform of the CFP outlining the roles of the EC, MSs, ACs, RFMOs and regional groups that allow effective governance of MRF through	Structures are in place, so would need EC and MS to develop an approach.	No action.

Measure	A vision for the future	Moving forward	WGRFS next steps
	bespoke regional approaches.		

The EU Control Regulation will impact on recreational fisheries data collection with a registry of recreational fishers and mandatory reporting for some species (see Section 2.2.1.3). The legal framework allows for 3 options for implementation each with varying degrees of centralization and user involvement: commercial solutions; custom MS systems; and a generic EU solution. This generates challenges (e.g. data quality, consistency, collation), but also opportunities (e.g. data sources, registries). This can be supported by the WGRFS, so a discussion was held to understand how best to support the EU and MS in implementation.

Significant challenges were identified, such as unclear registration processes, data quality concerns, stakeholder participation, fragmentation of data collection, and funding uncertainties. Solutions proposed include awareness campaigns, robust quality controls, stakeholder engagement, and ensuring coherence across legal frameworks. The conclusion was that successful implementation relies on clear responsibilities, adequate resources, and strong collaboration between MS, the fishing community, and the EU. The WGRFS will provide support to the EU with implementing the Control Regulations with the aim of developing both data collection and angler campaigns to maximize the benefits for data collection and monitoring.

Social and economic data collection for recreational fisheries is not included in the DCF nor Control Regulations, so represents a large gap in our knowledge and impacts on the ability to make decisions based on societal benefit. Currently, data collection is sporadic and opportunistic, carried out by individual countries, academics, and other interested parties meaning that collation of data for a fishery or stock is very challenging. There is an opportunity to integrate social and economic data into the catch reporting systems within the Control Regulations. The angling community are developing a proposal and will share it with WGRFS for comment.

The issue of bycatch of vulnerable species in recreational fisheries is becoming increasingly important. The WGRFS will aim to review the impact of these fisheries on vulnerable species and considering mitigation measures to reduce bycatch. This review will be carried out in collaboration with the ICES Working Group on Bycatch of Protected Species (WGBYC).

2.4.2 Survey methods

Leads: Annica de Groote and Stephen Taylor

The ISG on survey methods was structured into two main parts. The first part focused on ways to handle missing data in recreational fishing surveys. The rationale for this topic was provided through discussions/ideas generated over the last two years during WGRFS. The following three oral presentations provided a basis for a subsequent general discussion about missing survey data:

- Bias and precision of a monthly estimation framework to achieve annual catch per fisher estimation (Chun Chen, Wageningen University and Research, Netherlands).
- Imputation of missing data from time-lapse cameras used in recreational fishing surveys (Eben Afrifa-Yamoah, Edith Cowan University, Australia).
- Bayesian modelling of surveys when data are missing (Zachary Radford, Cefas, UK).

A common theme from these presentations was that missing data are often encountered in surveys, and without due consideration, this issue can lead to biased outputs. The focus of all presentations was on methods to adjust or compensate for missing data in the analysis by use of weighting or imputation. Ways to account for missing data were presented for a logbook survey

(Netherlands) and a remote camera survey (Australia). As part of the Bayesian presentation, worked examples for a UK dataset were provided using Multivariate Imputation by Chained Equations (MICE). In the Dutch study, a new estimation approach using simulation was evaluated for a recreational logbook survey with missing data. Post-stratification by month was shown to improve the precision of the overall (annual) estimates, while imputation of missing values reduced the bias. More insights into the benefits of imputation were provided in the Australian presentation, which focused on imputation of missing data from time-lapse cameras. Different Bayesian approaches to manage this problem were presented: multiple imputations for short-term time gaps and a Bayesian regression learning framework for longer gaps. Additional insights into Bayesian methods and multiple imputations were provided in the UK presentation by using a working example and R coding.

The second part of the ISG focused on sampling frame issues commonly encountered in recreational fishing surveys. The sampling frame discussion included the following presentations:

- Coverage matters: identifying and mitigating sample frame issues in recreational fishing surveys (Stephen Taylor, Government of Western Australia Department of Primary Industries and Regional Development).
- Use of a sampling frame with a flexible license system and online survey integration: some methodological issues (Marta Pujol Baucells, Institut de Ciències del Mar, Spain).

The first presentation was based on a review paper on coverage error in recreational fishing surveys (Taylor *et al*., 2025). The paper, which was based on case studies from several countries, is authored by a subgroup of ISG members and is an important output of the group. Both presentations highlighted the importance of identifying and correcting for coverage issues. Typically, survey practitioners must choose a suitable sampling frame in the absence of a readily available "gold standard" list of the target population. This makes the elimination of coverage bias an unrealistic prospect in many cases. A more realistic prospect is to reduce coverage error, particularly undercoverage, to a level at which survey estimates are deemed to be suitable for management without making a survey cost-prohibitive to implement.

Finally, the ISG on survey methods discussed future activities and outputs. The main output for 2025 and 2026 will be the planning and hosting of an international symposium on "Future Proofing Surveys" in late 2026. It was originally intended that this symposium would occur in October 2025 but due to the lower than hoped number of abstract submissions the timing and scope of the symposium is being revised.

During the ISG session, overlap between the survey methods and novel methods ISGs was also discussed. As a result, a first joint leadership meeting of the two groups to discuss overlapping scopes was held in July 2025. The option to merge the groups was discussed and rejected, partly since one merged group would be too large to manage, and since the novel method ISG is not only about surveys. The dialogue between groups continues with the aim to present a proposal at the 2026 WGRFS meeting.

2.4.3 Quality assessment of surveys

Leads: Pedro Veiga and Mafalda Rangel

The WGRFS Quality Assurance Toolkit (QAT) was created in 2013 (ICES, 2013). It was developed to ensure the quality of recreational catch estimates from national surveys, and to document bias in data collection to satisfy ICES and EUMAP requirements. This evaluation aimed at providing statements of quality of MRF data for end-users including stock assessment scientists, and identifying potential improvements to survey design (ICES, 2018). Since its development, the QAT

has been used to assess quality and provide guidance on the design and implementation of multiple types of national survey programmes.

In 2018 and 2019, the tool was reviewed to assess if it was still fit-for-purpose and/or if improvements could be made to the whole assessment framework. A thorough update was under-taken to address the subjectivity of some of the existing questions, provide a more logical flow of the questions, and create different assessment criteria for on-site and off-site surveys. Examples of text alongside what needs to be considered to answer the questions were also added to the QAT template. The main intent was to minimize different interpretations of the questions and increase consistency in the QAT assessments. Since then, the assessment template has been reviewed and improved on an annual basis.

In 2023 and 2024, considerable progress continued to be made in developing and strengthening the Quality Assessment Toolkit (QAT) and its supporting tools. Important outputs included additional revisions to the QAT template (e.g. adding an introductory section, improving guidance with examples tailored to survey types, and a more detailed recommendations section, finalization of the QAT workflow and expert advice process, an updated MRF glossary, etc. In parallel, further discussions on a concept for a QAT-related publication describing the toolkit's development and application. In parallel, discussions addressed the upcoming EU Control Regulation smartphone app (mandatory by 2026), focusing on how the QAT could be adapted to evaluate app content, data input, and quality assurance. Finally, there were some additional discussions around the collaboration and joint work with other ISGs to define key requirements for app and survey design, including on an online workshop planned to finalize these outputs.

In 2025, as the QAT tool had been thoroughly reviewed and refined over the previous years, the QAT ISG shifted its focus toward the assessment of national surveys, with future toolkit reviews planned on a three-year cycle. Accordingly, the 2025 session was dedicated entirely to evaluating two country surveys on recreational fishing: (1) Dutch marine and freshwater recreational fishing, and (2) marine recreational fishing effort and catch in metropolitan France (including Corsica). The main outputs from this work were the completed QAT assessments for each survey, provided in Annex 3.

2.4.4 Regional coordination and data storage

Leads: Lucia Zarauz and Estanis Mugerza

This ISG focused primarily on data storage and the integration of information on MRF into the Regional Database & Estimation System (RDBES). ICES aims to ensure that by 2027, all relevant information will be available in the RDBES for use by both the ICES assessment groups and the RCGs.

With this objective in mind, in November 2024, an official data call was launched by ICES to collect the most up-to-date estimates of marine recreational fishing catches and effort at the national level. Information was requested for all available years, or, if not possible, the most recent estimates. The geographic scope covers the Northeast Atlantic and adjacent areas, including FAO Major Fishing Area 27.

Seventeen countries responded to the call. Of these, eleven provided estimates, four provided both estimates and official data, and two provided only official data. Some countries contributed historical data, while others submitted more recent figures. Six countries provided only mandatory Data Collection Framework (DCF) mandatory species data, while eleven included relevant marine recreational fishing species. Six countries reported only retained catch data, and eleven reported both retained and released catches.

Nearly all countries provided estimates in weight, and eleven countries reported both weight and number of specimens. There was diversity in the reporting of error types. No issues were identified with the RDBES format designed for this purpose. There is the possibility to report error using different metrics (RSE/CI). Although bias assessment is not required when reporting official data, such data may be biased if all species, fishing gears, or geographic areas are not covered. It is necessary to review the vocabularies used as, in some cases, countries cannot partition data for retained and released catches or by gear. It may be useful to provide guiding questions for the description and/or assessment of bias, such as: "Are all mandatory species covered? Are all gears and platforms included? Is the entire geographic area represented?" It would also be helpful to ask whether the information provided is complete or if additional data are available.

The data call has allowed the collection of valuable information on marine recreational fishing in Europe. Despite some limitations in data separation and coverage, the RDBES format has proven suitable for integrating these data. It is recommended to continue improving clarity and encourage bias assessment to ensure the quality of reported data.

2.4.5 Catch and release and animal welfare

Leads: Simon Weltersbach and Keno Ferter

This session focused on scientific research and best practices related to catch and release (C&R) fishing, with particular attention to post-release mortality (PRM) and animal welfare. The aims of the intersessional group are to provide science-based guidance on C&R, identify research gaps, support studies on lethal and sublethal effects, and promote inclusion of PRM data in stock assessments.

Historically, European marine recreational fisheries had sparse PRM data, despite high release rates for many species (50–70%; Ferter *et al*., 2013). Over the last decade, however, several studies have been conducted (e.g. Weltersbach *et al*., 2013, Ferter *et al*., 2015; Ferter *et al*., 2017; Pinder *et al*., 2017; Lewin *et al*., 2018; Skov *et al*., 2023), leading to PRM estimates being incorporated into assessments for species like European sea bass, Atlantic cod, and Baltic Sea salmon (ICES, 2017a,b,c). Yet, knowledge gaps persist, especially in marine environments compared to freshwater and other regions like North America or Australia (Ferter *et al*., 2013).

Four talks were given as part of this session. Matthew Farthing from Rhodes University (SA) presented a comprehensive meta-analysis and decision-support tool developed with Alexander Winkler and an international team including members of WGRFS. The project aggregates global marine PRM data and builds a predictive model to help fisheries managers estimate mortality rates for species and contexts that are lacking direct studies. PRM depends on species physiology, environmental conditions, fishing method, and angler behavior. Despite the rise in C&R practices worldwide, data coverage remains uneven; managers often rely on poor proxies or assumptions. The study compiles 102 eligible publications and extracted 164 unique PRM estimates across 95 marine species. A Bayesian statistical model was developed using consistently reported predictors: species, family, presence of swimbladder, and barotrauma. The model showed that the interaction of swimbladder presence and barotrauma significantly increased PRM rates. The team is building a digital tool that allows managers to query predictions based on available criteria. It is still under development but aims to be user-friendly and regularly updated. Future improvements include building a broader global database and encouraging standardized reporting in future C&R studies.

Fritz Feldhege from IGB Berlin (DE) introduced the WAIDGERECHT project (https://www.igb-berlin.de/en/project/waidgerecht), which aims to identify best C&R practices for German anglers. While building on the global meta-analysis database, this project focuses on species

commonly caught in Germany, including both freshwater and marine species. The study assesses study quality based on sample sizes, use of controls, holding time, and experimental realism. Preliminary data show that lower-quality studies often over- or underestimate post-release mortality. One key output will be a German-language website summarizing species-specific guidelines, best practices, and robustness of evidence, aimed at anglers. Recommendations will be derived from the literature and translated into practical advice. The project emphasizes science communication and aims to promote responsible angling in Germany.

Mehis Rohtla from the University of Tartu (EE) shared plans to study C&R impacts on pikeperch (*Sander lucioperca*) in the brackish Pärnu Bay area (Baltic Sea), where the recreational pikeperch fishery is popular. Due to stock declines and concerns about recreational impacts, recreational trolling for pikeperch has been banned in summer. The study plans to reassess catch composition and update a 2015 and 2016 study that showed high release rates of undersized fish. The aims of a complementary mortality study are to evaluate effects of water temperature, hooking injuries, and angling techniques on pikeperch post-release survival, and to engage with local anglers to ensure buy-in and generate reliable, actionable data.

Adam Fisher from the University of Gloucestershire (UK) presented on angler behavior and C&R practices in England and Wales (Fisher *et al*., 2025). His research focused on how angler decision-making, knowledge, and values influence fish welfare and release outcomes. While many anglers support C&R, practices vary widely in effectiveness. Factors like delayed hook removal, improper handling, prolonged air exposure, and photographing fish can significantly increase stress and mortality. Educational interventions and outreach have improved behavior in some cases, especially when tailored to specific fisheries or communities. There is a need for clearer, evidence-based guidelines for best practices and wider dissemination through angler clubs, online platforms, and gear retailers. Fisher emphasized that even small behavior changes can reduce mortality.

The WGRFS session highlighted growing scientific attention to C&R impacts and a shift toward integrating PRM data into fisheries management (Weltersbach, 2018). While much progress has been made, data limitations, variability of study quality, and inconsistent angler practices remain challenges. The development of predictive tools, national best-practice initiatives, and angler engagement strategies offer promising paths forward.

2.4.6 Stock assessment and reconstruction

Leads: Martina Scanu and Zachary Radford

Three presentations were given during the session. The first, delivered by Karina Ryan from Australia, outlined methods applied in a relatively data-rich context and described approaches used to allocate catches between sectors. The second presentation, given by Wendy Edward, focused on methodologies for reconstructing data in comparatively data-limited situations. This included examples for northern sea bass, pollack in areas 6 and 7, and Irish Sea whiting, with accompanying code provided to demonstrate the reconstruction process. The final presentation, by Fabian Zimmerman and Johanna Marcussen, discussed the incorporation of recreational fisheries survey data into stock assessments for *Nephrops*, halibut, and lobster. They reported that while the effects of including MRF data were sometimes marginal, model fits generally improved when such data were incorporated. Their work emphasized the importance of "future-proofing" assessments, ensuring readiness for the inclusion of improved data and assumptions as they become available. The presentation also highlighted the role of representation in scientific advice, creating awareness of MRF impacts and maintaining pressure on managers to account for them.

Following the presentations, the session continued with a review of the updated Productivity Susceptibility Analysis (PSA) results. Participants were divided into subgroups, each composed of experts who reviewed outcomes across different ecoregions. There was broad consensus on most of the findings, though several species were identified as requiring further analytical updates to better reflect their true levels of risk.

2.4.7 Novel methods

Leads: Christian Skov, Valerio Sbragaglia, and Paul Venturelli

The ISG on novel methods started with the chairs giving a status update for the milestones achieved during the last years. This included:

- Development of a best practice document that can support managers who wish to include data collection via angler apps in their data collection programme. This work remains in progress.
- Engagement in the consortium "Machine learning for fish species and size identification". Several members of the ISG are members of this consortium. Participation in the planning of the ICES symposium on non-probability methods that was to be held in Sweden October 2025. ISG members submitted abstracts and planned a hands-on workshop, but the symposium was recently postponed to 2026. The ISG plans to participate in this symposium in 2026.
- Maintenance of an online spreadsheet for members of relevant papers and planned, ongoing, and completed projects and other activities related to novel methods. The purpose of the spreadsheet is to support information sharing and foster collaborations. ISG members and their colleagues updated the spreadsheet before, during, and after the meeting. There are now over 60 papers listed, and the number of projects has ballooned to over 50 from ~40 countries and regions. The increase in projects and countries is probably related to the recent EU reporting mandate. Three quarters of the projects include reporting via apps/websites, and approximately half of the projects involve citizen science. We have also noticed an increase in the number of projects that reported using novel methods in management (20 of the 35 projects that completed this field).

Bernat Morro (IMEDEA (CSIC–UIB), Spain) gave the presentation "Reliability of self-reported catch and effort data via smartphone applications in a multispecies recreational fishery" (Morro *et al*., 2025). Since 2019, anglers in the Balearic Islands have had to report fishing trips in Marine Protected Areas (MPAs) via paper or the "Diari de Pesca Recreativa" app. The app records MPA, fishing type, times, and catch for 80 species. In the present study data from 3672 app reports and 320 creel inspections were compared and showed similar results. However, Catch per Unit Effort (CPUE) app data tends to overestimate due to misreported trip durations, while creel surveys underestimate due to mid-trip inspections and limited sampling. Hence the correct CPUE was likely to be found in between the two estimates. The study concluded that mandatory self-reporting app can be a viable monitoring tool, and its biases are systematic and correctable. Combining app and creel survey data provides more accurate indicators for fisheries management

Zachary Radford (Cefas, UK) presented a study that compared two approaches to surveying UK recreational sea anglers: on-site probabilistic surveys (Catchwise) and off-site self-selecting surveys (Sea Angling Diary Project). While on-site surveys are less biased but expensive, off-site surveys offer cost-effectiveness at the risk of potential bias. The presentation demonstrated that model-based statistical approaches, particularly Multilevel Regression and Post-stratification for off-site data and advanced modelling for on-site data, outperform traditional design-based methods like bootstrapping. These models effectively correct for systematic undersampling issues, such as missing high-activity periods, and produce more consistent and accurate estimates of

angler effort and catch. Despite their methodological differences, the presenter showed that both surveys yielded comparable total effort estimates for 2012 and 2023, with most species' catch estimates having overlapping 95% CI between approaches. Minor discrepancies in certain species (mackerel, whiting, wrasse) likely reflect differences in reporting behaviour rather than fundamental survey failures. The key recommendation from the presentation was to adopt model-based methods for future survey extrapolation, as they provide superior bias control and more reliable estimates than conventional design-based approaches.

Olivia Cervantez (Ball State University, USA) presented preliminary data from an ongoing study that explored differences and similarities in recreational fishing app data both within and across fisheries in France and Denmark. The study showed differences in reporting and identified potential implications for management. In France, FishFriender users were divided into two groups: casual users and citizen science users. Citizen science users were retained for longer and recorded more trips per user than casual users. This suggested that prolonged contact and communication with users increases retention and reporting. In Denmark, fishing metrics for the coastal sea trout fishery were compared across two apps: Fangstjournalen (FJ); and Fishing in Denmark (FiDK). Although both apps had similar reporting fields, we found differences in reported fishery metrics. FJ users recorded significantly more trips, zero-catch trips, and catches, but reported shorter trip length. Both studies underscore the importance of choosing an app or user group for data collection. The findings suggest that combining data across apps and user groups may enhance spatial coverage, but such integration requires careful consideration of differences in reporting and data quality. Continued monitoring and calibration of apps are needed as user bases grow and evolve. Future work should examine the effects of the EU mandate on reporting along with validation of the FishFriender and Fishing in Denmark app data.

Harry Strehlow (Thünen, Germany) presented "EU app: Insights from a country representative". The presentation explored the opportunities and challenges associated with the new EU Control Regulation and its implications for recreational fisheries data collection. Beginning on January 10, 2026, all sea anglers in Europe will be required to register and electronically document their daily catches for species subject to EU conservation measures that specifically apply to recreational fishing, e.g. Baltic salmon, western cod, and sea bass in Area 4.a. From January 1, 2030, this obligation will extend to other species for which recreational fishing has a significant impact on fishing mortality.

A new RecFishing App is under development and will be available for testing by Member States in September 2025, with the central server API expected to become operational by December 2025 to connect national apps.

Three main challenges and corresponding opportunities have been identified:

1. Registration of sea anglers: incomplete registries are likely due to focus only on a few mandatory species. However, the new regulation offers an opportunity to ensure the registration of all marine recreational fishers, since unwanted bycatch of mandatory species applies to all sea anglers. Registries are also essential to researchers, providing contact data for panel surveys and helping to reduce the costs of population-level surveys.
2. Data quality: many anglers are unaware of the new regulation on electronic reporting, and insufficient controls could lead to unreliable data. To address this, awareness campaigns and transparent communication are recommended, along with consistent control measures at the national level. Data quality will ultimately depend on the willingness of the recreational fishing community to participate, report accurately, and feel empowered in management processes.
3. Interested party participation: strong top–down regulatory approach may alienate anglers and decrease participation. To counter this, collecting social and economic data could foster greater buy-in from the sector. Trust—built over years between

policymakers, industry representatives, and scientists—is essential to successful interested party collaboration.

The Control Regulation represents a "window of opportunity" since conventional data collection methods have reached their limits, e.g. fewer charter vessels that allow large-scale collection of biological data and new fishing methods, such as from belly boats and kayaks, which lead to a much greater distribution and diffusion of fishing effort and thus survey effort to ensure coverage. Greater participation by anglers in data collection can generate richer information encompassing biological, social, and economic dimensions. If implemented properly—with clear communication and mutual understanding—the reform can strengthen environmental stewardship. Anglers can also contribute valuable environmental monitoring data, such as reports of invasive species, fish kills, algal blooms, marine mammal sightings etc.

Finally, survey results from a representative German recreational fishing survey showed that while digital platforms are becoming increasingly important for fisheries data collection, German anglers rarely use them for sharing information. Low usage is linked to a lack of trust in digital platforms, and age negatively influences their use, while centrality increased participation. Therefore, addressing the factors that hinder digital engagement—particularly trust and transparency—is crucial.

The success of the new EU Control Regulation for recreational fisheries depends on combining technical innovation with social engagement. Digital tools like the RecFishing App will only be effective if anglers trust the system and feel meaningfully involved in fisheries management. Transparency, communication, and empowerment are thus central to ensuring high-quality, comprehensive data and long-term success.

In summary, the talks showed that the ISG still houses and fosters a well-developed international research discussion, particular on the use of fishing apps in research and monitoring recreational fishing. This is not surprising giving that most MS plan on using apps to meet the EU's electronic reporting requirement. The experiences so far seem to indicate that the data collected from apps can be of similar quality to creel and recall surveys, but that there is a lot of uncertainty (e.g. depending on app user interface, target groups and the approach that is used to analyse the data). Hence, there is a strong need for continued research in this area.

At the meeting, we discussed the potential content overlap between the Survey Methods ISG and the Novel Methods ISG. Over time, both groups have included presentations focusing on the analysis of non-probability data. Following up, the ISG leaders met in July and proposed renaming the Novel Methods ISG to Digital Methods ISG. Many of the methods discussed are no longer truly "novel" — for example, app-based data collection has been used for over a decade, and will soon be part of standardized data collection under the upcoming EU Control Regulation. One option is that Digital Methods ISG focus on the design, use, and implementation of digital methods (e.g. apps, drones, social media, etc.), whereas studies that focus solely on the analytical aspects, such as the analysis of non-probability data from digital sources, is directed to the Survey Methods ISG. In future, we plan to have a continuous interchange of information between the two ISGs and calibrate direction and actions with respect to the new developments in recreational fishing monitoring and research. The dialogue between the ISG groups continues with the aim to present a proposal at the 2026 WGRFS meeting.

2.4.8 Human dimensions

Leads: Harry V. Strehlow, Warren Potts, and Christian Skov

The session focused on measuring angler heterogeneity looking at a Danish example that focused on exploring heterogeneity of coastal seatrout anglers in the Baltic Sea through the recreational

specialization framework presented by Christian Skov. Then Harry Strehlow presented a German example assessing management preferences and catch outcomes in a highly specialized recreational fishery – The Baltic Sea salmon trolling fishery. There was agreement that this information is in general very useful, but survey agents need to be highly skilled when asking psychometric questions and applying a Likert scale.

The second aspect of the session dealt with angler compliance. Christopher Bova presented methods for assessing compliance ranging from the basic identification of non-compliance to the long-term monitoring of compliance and the drivers behind it. Awareness of regulations is important to differentiate between intentional vs. nonintentional compliance. Therefore, assessing regulatory knowledge can be a first step in getting baseline data, e.g. to compare before and after behavior after information campaigns.

The third part of the session focused on the identification of social and economic indicators particularly to aid resource allocation decisions. Wendy Edwards presented factors influencing site choice among recreational sea anglers in England and Wales using the travel cost method. Factors such as expected catch, travel distance, and site accessibility significantly influenced site choice across all models. Exploring economic leakage is key to determine the contribution to local economy (local level impact) as an important indicator for MRF development and decision-making.

2.4.9 Communication and engagement

Leads: Sean Tracey and Pablo Pita

Since its establishment in 2021, the ICES WGRFS Intersessional Group on Communications and Engagement has worked to strengthen how recreational fisheries science connects with managers, policymakers, fishers, and the broader public. Under the coordination of Pablo Pita and Sean Tracey, the group set objectives to raise the visibility of communication in research, refine strategies for interested party engagement, and develop clear, practical recommendations for the community.

In previous years, the group produced an infographic to explain the main features and contributions of marine recreational fisheries in accessible terms. It also launched surveys among WGRFS members and beyond to identify barriers, opportunities, and lessons learned from successful initiatives worldwide. These insights shaped a strategy focused on clearer language, trusted messengers (including influential anglers), and diversified channels such as in-person meetings, e-mail briefings, and webinars.

This work culminated in a dedicated publication in Frontiers in Marine Science (Pita *et al*., 2025), co-authored by 37 contributors, including academics, fisheries managers, NGO representatives, and members of recreational fishing associations. The paper offers practical recommendations for improving scientific communication and interested party engagement. Key recommendations include:

- Tailored messaging: crafting communications for specific audiences and choosing the right channels to reach them.
- Collaborative consortia: forming multi-interested party consortia to ensure transparent, co-created content and long-term collaboration among researchers, managers, and fishers.
- Accessible data: translating data shared by fishers into clear, transparent information to improve data collection and trust.
- Formalized partnerships: establishing agreements between researchers and fishers, supported by regular face-to-face meetings to build trust and lasting relationships.

- Community-focused campaigns: designing interdisciplinary, creative, and culturally relevant outreach efforts that use art, science, and interactive activities to foster deeper public engagement with sustainability and conservation.
- Strategic use of channels: recognizing that recreational fishers often connect through informal social media like Facebook, Instagram, and WhatsApp; managers and policymakers prefer platforms like X (formerly Twitter) and podcasts; while researchers tend to use LinkedIn and ResearchGate. Combining these effectively maximizes reach and impact.

These strategies are vital for supporting new European regulations that require better data reporting by recreational fishers, building trust, and ensuring successful implementation of management measures.

The group's 2025 session focused on putting these research findings into practice, especially around integrating digital tools—such as data collection apps—into scientific monitoring and management frameworks. Discussions addressed how the recommendations from Pita *et al*. (2025) align with members' practical experience, and where further work is needed.

Key challenges identified included:

- Tool readiness: uncertainty remains about the current development status of some data collection apps, their technical capabilities, and how well their data can be used for stock assessments or enforcement.
- Data quality and governance: there is a continued need to ensure the consistency, quality, and governance of app-generated data, so that it complements established DCF systems.
- Outreach and trust: policymakers, public managers, and interested party groups need clearer, targeted communication about how digital tools add scientific and management value. Without this, trust and user engagement could suffer.

To address these priorities, the group agreed to organize a webinar with the goal to explain how integrating digital data sources can support science-based recreational fisheries management and monitoring. The target audience will include policymakers, scientists, managers, and interested party organizations. A small planning team has been formed to develop the concept, format, and speaker line-up.

2.5 Other topics of interest

2.5.1 Food safety and human health issues

Lead: Martin Wiech

This focused on potential high exposures of MRF to contaminants as they may fish close to the coast in contaminated areas and may have high fish consumption rates (Vølstad *et al*., 2011). However, there are many benefits from eating seafood, so methods to assess risk vs. benefit were introduced. This led to the recognition of recreationally caught seafood to food security.

During the session, the results of the survey conducted last year within the group on the extent of existing advice on the intake of self-caught seafood were presented and discussed. Two case studies from Norway were presented, using different methods to examine risks and benefits from seafood consumption:

The first study by Lily Småland used a deterministic approach targeted recreational fishers by assessing their seafood intake, both from self-caught and store-bought with a detailed food frequency questionnaire including an extensive list of seafood items available in Norway. Occurrence data of nutrients were obtained from public and freely accessible databases, with mercury data retrieved from open-access research articles. The estimated exposure was compared to

recommended nutrient intakes published in the Nordic Nutrition recommendations 2023 and the existing tolerable weekly mercury intake (TWI) set by the European Food Safety Authority (EFSA). Preliminary results showed that only a few of the highest consumers exceeded the TWI for mercury. Regarding nutrients, the contribution to the recommended intake was low to moderate for vitamin D, selenium and iodine, while the contribution of the important fatty acids EPA+DHA was high.

The second case study (Ho *et al*. 2025) introduced a probability-based approach using supervised machine learning to assess risk and benefits from existing occurrence data of a large range of nutrients and contaminants in five important fish species from Norwegian waters. Fatty fish species had higher nutrient scores than lean fish as they contain high levels of EPA+DHA, selenium and vitamin D. Consuming the Norwegian recommended weekly amounts of lean fish (300 to 450 g) was found to not display a risk from mercury, dioxin, and DL-PCBs exposure. For fatty species, a weekly consumption of the recommended intake may lead to exceedances of the TWI for dioxins and DL-PCBs ($p>0.05$). However, the fatty species are excellent sources of EPA+DHA, selenium and vitamin D and the nutritional benefits may outweigh the risk from contaminant exposure.

Discussing the case studies and important nutrient contributions of seafood during the session, the importance of recreational fishing for food security increased. Possible collaborations were discussed assessing the potential role of recreational fisheries as a supply of important nutrients to the population. Considering the recent destabilization of food supplies caused by global disruptions from pandemics and conflict, this is a timely topic of increasing interest.

2.5.2 Climate impacts on MRF

Lead: Bryony Townhill

The session explored the various impacts of climate change on recreational fishing, highlighting both challenges and opportunities for fishers and managers. Climate change is altering the physical, biological, and economic landscape of marine ecosystems, leading to shifts in the distribution and abundance of key recreational species across and the opportunities for MRF (Townhill *et al*., 2019).

Recent research demonstrates significant northward and depth-related shifts in the distribution of popular recreational species such as cod, sole, plaice, and mackerel. For example, cod have moved to deeper and more northern waters in the North Sea, primarily due to warming, while eastward shifts are linked to fishing pressure (Engelhard *et al*., 2014). Sole now remains in shallower waters year-round, increasing their availability to recreational fishers (Engelhard *et al*., 2011). Warm-water species such as bluefin tuna, sea bass, and red mullet are expanding northwards around the northwest European shelf, while traditional cold-water target species may decline. The CHART (CatcH And Release Tag) programme for Atlantic bluefin tuna in UK waters is an example of adaptive management, with over 3,000 tuna tagged, leading to significant economic benefits for coastal communities. For the future, ensemble species distribution models project that, by 2060, the UK Exclusive Economic Zone (EEZ) will become more suitable for some species (e.g. sea bass, anchovy) and less suitable for others (e.g. cod, haddock) under various climate scenarios (Townhill *et al*., 2023). Vulnerable species such as elasmobranchs may see increased habitat (Couce *et al*., 2025).

Recreational fishers are already adapting, and risk assessments—such as those conducted in Namibia—help identify biological, social, and economic adaptation options (Engelhard *et al*., 2024). The ICES/PICES Strategic Initiative on Climate Change Impacts on Marine Ecosystems (SICCME) fosters international collaboration, synthesising knowledge and supporting policy

development, and is available to offer expertise to other ICES groups who are incorporating climate change into their work (https://www.ices.dk/community/groups/Pages/SICCME.aspx).

In summary, the future of recreational fishing will depend on our ability to understand, anticipate, and adapt to climate-driven changes. Ongoing research, stakeholder engagement, and evidence-based policy ensure the sustainability and enjoyment of recreational fisheries.

2.5.3 Management strategy evaluation (MSE)

Lead: Rebecca Holt

European sea bass (*Dicentrarchus labrax*) represents an important economic, ecological, and social resource for both the commercial and recreational fisheries. From 2009–2018, the northern stock covering the North Sea, English Channel, Celtic Sea and Irish Sea, declined rapidly due to a combination of poor recruitment and fishing mortality. This resulted in the introduction of management measures for both the commercial and recreational fisheries sectors in 2015.

Stock assessments for such a species as sea bass are complex and like many other species stock assessments, a degree of uncertainty is commonplace. Uncertainty can arise from several sources including, but not limited to, data inputs, e.g. catch and natural mortality. To conserve the sea bass stock, it is important that uncertainty within the stock assessment is understood and accounted for in management decisions. One large source of uncertainty lies within recreational removal data, where only a single estimate available for 2012 was used in the assessment. Recreational catches are reconstructed prior to 2015 and then from 2015–2021 recreational removals are derived from scaling down the fishing mortality rate (F) from 2012 to account for management measures in these years, assuming full compliance. We explored this uncertainty in recreational catch data for sea bass using a multi-step approach.

First, a simple simulation approach was used to test alternative recreational removal datasets (n = 21) in the assessment model to explore the consequences for bass assessment outcomes. First, alternative datasets are simulated from 1985–2023. Second, for the latter part of the time-series from 2015 onwards is focused on, representative of decreasing levels of compliance following the introduction of management, and lastly, data were simulated for the entire time-series, a combination of the first two sets of simulations. Reference points (B_{lim}, B_{pa}, MSY $B_{trigger}$, F_{lim}, F_{pa}, and F_{MSY}) are recalculated for each simulated dataset (n = 21).

Second, an ensemble model was developed using Stock Synthesis (SS) to translate uncertainty in recreational removal data into uncertainty of stock assessment outputs for sea bass. The current baseline sea bass stock assessment and alternative assessments using different recreational removal dataseries were used as input for the ensemble model. Each alternative assessment run was weighted using an objective weighting approach based on model performance statistics and interconnected diagnostic testing. MSY and precautionary reference points were calculated from the final ensemble model.

We found that the effect of alternative recreational catch scenarios on stock assessment outcomes is complex as is the recreational data itself. Results from initial simulation testing suggested that deviations from current recreational catch data may negatively impact the northern sea bass stock. We found that any single assumption on the recreational removals dataseries may impact the catch advice and will carry a risk to the stock status. For the initial simulation approach, we found that spawning-stock biomass (SSB) and total biomass were pushed into further decline for all simulations compared with the baseline reference assessment. Results indicated that the latter part of the recreational time-series, from 2015 onwards, may be more sensitive to change. All simulation runs resulted in changes to the biological reference points used in the ICES advice rule. F_{lim}, F_{MSY} and F_{pa} varied more than B_{lim}, B_{pa}, and B_{lim}, B_{pa}, and MSY $B_{trigger}$ all increased in

several simulations indicating that changes in headline advice and management measures for this stock may result from changes in recreational catch data.

The ensemble model development built upon the initial simulation work and provided an extra step towards quantifying the link between high uncertainty in recreational data, perception of stock status and the risk of falling outside 'safe' limits.

More information is needed on the compliance of recreational fleets as well as continued efforts to improve recreational surveys to meet EU requirements. This work is representative of preliminary exploration into the recreational removals within the current sea bass assessment, results should be used with caution and should not be used to support advice. Nevertheless, these are important steps in assessing uncertainty in recreational fisheries data. Further model development is needed, particularly in relation to testing the assumptions made to reconstruct the recreational removals time-series prior to 2012. Additionally, this ensemble work could be expanded upon to test forecast assumptions and resulting advice, as well as updated with the latest assessment model and reference points of the ICES 2024 benchmark outcomes (ICES, 2025).

2.5.4 Practitioners guide

Leads: Sepp Haukebo and Warren Potts

Marine recreational fisheries provide a suite of cultural, environmental, and economic benefits to individuals, communities, and nations. However, recent global analyses found that new and/or improved recreational fisheries policies are needed in countries around the globe to increase the benefits associated with recreational fishing, to reduce conflict with commercial and small-scale fishers, and to achieve sustainable marine fisheries. This practitioner's guide was developed in response to numerous requests from fisheries managers for concise, user-friendly advice on the most appropriate methods to govern marine recreational fisheries (Potts *et al*., 2025). In this document, we synthesize and reconcile existing approaches and provide a step-by-step guide for fisheries managers who are tasked with managing marine recreational fisheries that target fish (i.e. not invertebrate recreational fisheries). These guidelines are embedded in socio-ecological systems thinking, which considers all dimensions (i.e. governance, ecological, and human) of recreational fisheries and incorporates the principles of the Ecosystem Approach to Fisheries Management, including co-design, co-management, and consideration for the ecosystem and societal system. The guide has been developed to be brief and provide the most important basic information; it also attempts to provide links (to freely available material) for further reading. While this resource has been developed for countries with growing marine recreational fisheries, the principles presented are general and provide guidance to countries with large MRF, to recreational fisheries in freshwater environments, and to recreational fisheries that target non-fish species.

3 Revisions to the work plan and justifications

All the resolutions and tasks were covered. No further changes are requested at this stage.

4 Next meeting

The next meeting of WGRFS will be held in Sète (France) from 15–19 June 2026.

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Annex 2: Resolutions

2022/2/FRSG36

The **Working Group on Recreational Fisheries Surveys** (WGRFS), chaired by Kieran Hyder, UK, and Estanis Mugerza, Spain, will work on ToRs and generate deliverables as listed in the table below.

	Meeting dates	Venue	Reporting details
Year 2023	19–23 June 2023	Ancona, Italy	Interim report by 01 November 2023 to FRSG
Year 2024	3–7 June 2024	Horta, Azores, Portugal	Interim report by 01 November 2024 to FRSG
Year 2025	2–6 June 2025	Faro, Portugal	Final report by 01 November 2025 to FRSG

ToR descriptors

ToR	Description	Background	Science plan codes[14]	Duration	Expected deliverables
a	Collate, review quality, and identify significant gaps of coverage and species of the: i) National submissions to the ICES data call on Marine recreational fisheries (MRF). ii) National estimates of recreational catch and effort, catch-and-release impacts, and socio- economic benefits for candidate stocks available to experts attending WGRFS.	Most countries are engaged in data collection. This activity collates national participation, catch and socio-economic datasets together, understands the quality of data, and highlights where new data are needed. This is important for supporting the ICES TAF and ecosystem approach. WGRFS chairs, ICES Secretariat and ACOM have started a process to identify the relevant contacts and organizations dealing with MRF as well as the specifications of the data collected across ICES Member Countries. The intersessional group on regional coordination and data storage will work on the data submitted to ICES in response to the data call for the possible incorporation into the RDBES agreed upon	2.1, 3.1, 3.2, 5.4	Regular activity in each year, with intersessional tasks and workshops to develop new approaches.	Report WG that identifies and prioritizes MRF data gaps of relevance to assessment WGs and ICES advice, publication of scientific papers and report to relevant assessment expert groups. Ensure MRF data are integrated into the RDBES structure with appropriate raising and estimation in TAF.

[14] Note: these resolutions refer to the former Science Plan codes approved in 2018. The current Science Plan codes are available here: https://www.ices.dk/about-ICES/how-we-work/Documents/SciencePlanCodes_2025.pdf

ToR	Description	Background	Science plan codes[14]	Duration	Expected deliverables
		format, possible use by ICES assessment groups and support end-users needs.			
b	Assess the validity of traditional knowledge, new survey designs, novel methods (e.g. citizen science, apps), innovative statistical methods for data provision, and approaches for selecting appropriate cost-effective methods.	Recreational data can be collected in many ways, with different associated biases. This supports improvement of analysis of existing surveys and understanding the utility of new methods. This will lead to the most robust and broad evidence- base to underpin assessment and advice.	3.1, 3.2, 3.3, 3.6, 4.1, 4.3, 4.4, 5.4	Regular activity in each year, with intersessional tasks and workshops to develop new approaches.	Report WG perspectives and publication of scientific papers
c	Provide guidance and input to benchmark processes and special requests. Inform ACOM on the availability of data, design of data collection programs, data storage systems, use of data in assessments, catch allocation, and ecosystem approach.	Recreational catches are not included in many assessments and data collection is limited to a few species. This activity supports data collection requirements, access to data and methods needed. This will facilitate embedding recreational fisheries into fisheries management.	3.1, 3.2, 3.3, 3.5, 3.6, 5,1	Regular activity in each year, with intersessional tasks and workshops to develop new approaches.	Better inclusion on MRF data into stock assessments and advice,
d	Develop approaches for regional data collection programmes that generate robust data for end-users and support the ecosystem approach.	Regionalisation is an important goal, but implementation is unclear This is a challenge for recreational fisheries due to the different actors, gears and survey instruments. This will underpin generation of transparent and robust regional data to support a variety of end-users needs.	3.1, 3.2, 3.3, 3.6,	Regular activity in each year, with intersessional tasks and workshops to develop new approaches.	Report WG perspectives and publication of scientific papers.
e	Evaluate the use of economic (e.g. impact, valuation), social (e.g. governance, behaviour, welfare, health), and communication (e.g. participatory process, messaging) to support the assessment and	Recreational fisheries have broad benefits and behavioural responses are difficult to predict due to diverse motivations. Hence, understanding of the human dimension is needed. This develops understanding of the data and methods needed for codesign.	7.1, 7.4, 7.6	Regular activity in each year, with intersessional tasks and workshops to develop new approaches.	Report WG perspectives and publication of scientific papers and contribute to Fisheries Overviews and Ecosystem Overviews.

ToR	Description	Background	Science plan codes[14]	Duration	Expected deliverables
	management of recreational fisheries.				
f	Review outcomes of the workshops organized by the group.	Recreational fisheries is a diverse topic, so not all aspects can be addressed at WGRFS. A number of workshops on specific topic have been done or are in the workplan. This reviews outcomes of the workshops and the implications for recreational fisheries.	5.4, 7.1, 7.4	Activity-dependent on workshop	Report WG perspectives and publication of scientific papers.

Supporting information

Priority	High; the biological, social and economic impact of recreational fisheries is becoming increasing recognized and needs to be included in the fisheries assessment and management processes.
Resource requirements	None.
Linkages to ICES committees or groups	ACOM, WGBFAS, WGEEL, WGBAST, WGCSE, WGNSSK, WGBIE, WGMEDS, and benchmark workshops for stocks that have recreational catches.
Linkages to other organizations	• EC, STECF, Regional Coordination Groups, Advisory Councils. • WECAFC/OSPESCA/CRFM/CFMC/MEDAC Working Group on Recreational Fisheries. • Many linkages to (inter)national angling associations, since WGRFS members estimate national marine recreational catches. • Links to broader organizations with interests in angling and fisheries management including EIFACC and FAO.

Supporting information

Priority	High—the biological, social and economic impact of recreational fisheries is becoming increasing recognized and needs to be included in the fisheries assessment and management processes.
Resource requirements	None.
Participants	The WG is normally attended by around 60 members and chair-invited experts.
Secretariat facilities	Normal backstopping support in the organization of the group.
Financial	None.
Linkages to ACOM and groups under ACOM	ACOM, WGBFAS, WGEEL, WGBAST, WGCSE, WGNSSK, WGBIE, WGMEDS, and benchmarks workshops for stocks that have recreational catches.
Linkages to other committees or groups	• EC, STECF, Regional Coordination Groups, Advisory Councils. • WECAFC/OSPESCA/CRFM/CFMC/MEDAC Working Group on Recreational Fisheries. • Many linkages to (inter)national angling associations, since WGRFS members estimate national marine recreational catches. • Links to broader organizations with interests in angling and fisheries management including EIFACC and FAO.

Linkages to other organizations	• EC, STECF, Regional Coordination Groups, Advisory Councils. • WECAFC/OSPESCA/CRFM/CFMC/MEDAC Working Group on Recreational Fisheries. • Many linkages to (inter)national angling associations, since WGRFS members estimate national marine recreational catches. • Links to broader organizations with interests in angling and fisheries management including EIFACC and FAO.

Annex 3: Assessment of national survey programmes using the QAT

France

SHORT DESCRIPTION OF THE SURVEY (main objective, scope, and key details on sampling approach and implementation stage)

List the study main objective(s) and scope of the study. Some additional details should be provided on the recreational fishing modes being surveyed, scale (regional, national, multi-country), the study area, if it is a long-term monitoring survey, one-time study, stage at which is the survey (i.e. design, implementation, data analysis, report writing, completed) etc

The objective of the study is to assess the effort and the volume of capture, assignable to marine recreational fishers. The study is being carried out to comply with the EU Data Collection Framework (DCF). It adopted a multispecies approach and was conducted at the national scale (metropolitan France, excluding overseas territories). The study for the 2025–2027 period is based on a dual-survey design that combines an off-site panel survey and an on-site probabilistic survey, offering a complementary approach to data collection:

- **(1) Panel Survey (PS):** A survey is being conducted on a sample of volunteer recreational fishers. The aim is to follow a whole year of recreational fishers' activity. Participants record all information on their fishing sessions, including effort and catch data, using the Fishfriender mobile/web application (https://www.fishfriender.com). Additionally, data from the CatchMachine mobile application (https://www.calanques-parcnational.fr/fr/telechargez-catchmachine), which is mandatory in some marine protected areas of Mediterranean, are also add to the study.
- **(2) On-site survey (OS):** survey planned for 2027. It will use a probabilistic sampling design to collect face-to-face data during fishing activities. A total of 1,500 interviews will be carried out, based on 300 days of fieldwork spread across the three maritime regions (Channel, Atlantic, Mediterranean). Surveyors will record demographic characteristics, fishing behaviour, and biological data, including measurements of key species such as European sea bass (*Dicentrarchus labrax*), Pollack (*Pollachius pollachius*), and gilthead sea bream (*Sparus aurata*). Local knowledge from federation members conducting the surveys will facilitate access to a wide range of fishing areas, including underrepresented or low-effort sites.

The off-site survey is implemented but not yet completed, and the on-site survey is still on design.

Objective(s)	Estimate marine recreational fishing effort and catch in metropolitan France (including Corsica).
Target population	All recreational sea fishers in metropolitan France. Apps are only in French so foreign fishers will not be included.
Sampling approach	A complemented sampling approach is used, combining: • An off-site panel survey using the 2 mobile applications (FishFriender and CatchMachine) to estimate fishing effort and catches (number of fish caught, kept or released). App 2 (CatchMachine) is mandatory for MPA in the Mediterranean but there is uncertainty regarding zero catch trips • An on-site survey to collect information on catches (number of fish caught, kept or released) and biological data (length, weight). The surveyors will be recruited through the fishing federations. There are no licenses to be used to access effort. Counts of anglers can be used for effort
Scale	National (metropolitan France and Corsica)
Fishing modes	Marine spearfishing, boat angling, and shore angling are included. Shore shellfish gathering is not included.
Stage	Ongoing. The on-site survey is being designed, and the off-site survey is being implemented.
Country presentation (yes / no)	Yes

DESIGN				
	QUESTION	ANSWER	OFF-SITE SURVEY COMMENTS (if not applicable, type NA)	ON-SITE SURVEY COMMENTS (if not applicable, type NA)
Target population	Have all components of the target population been identified?	Yes	All recreational fishers French speakers over 15 yrs are eligible, whether occasional or regular, shore or boat-based, novice or experienced, including charters and spearfishes. Shore shellfish gathering, non-residents and overseas territories are excluded.	All fishers encountered in the field French speaker over 15 yrs, shore anglers, boat anglers, and spearfishers, are eligible, including all experience levels. Shore shellfish gatherers, charters, visiting fishers and overseas territories are not surveyed.
	Is there a component of the target fishery that is not covered by the survey and if so, what was it?	Yes	The digital panel excludes fishers without any Internet access (neither smartphone nor computer) and may underrepresent very occasional anglers.	Surveys are conducted by day—weekdays, weekends, and holiday periods—but do not include night-time fishing, so nocturnal fishers are not captured. Fishers fishing from private access points are also not covered.
	Are there elements of the target population that are not accessible, and if so, what are they (e.g. private access points or unlisted telephone numbers)?	Yes	Anglers without Internet-enabled devices (smartphone or computer) cannot be reached by the panel survey.	Face-to-face surveys allow us to interview fishers, including those without telephones or tourists, but miss fishers launching from private ramps or uncharted access points.
	Study population		The study population includes recreational fishers (French speakers and residents) who have Internet access. They are volunteer via FishFriender or registered in CatchMachine. It includes occasional, regular and very regular fishers across metropolitan France (Channel, Atlantic, Mediterranean), all fishing modes (shore angling, boat angling, spearfishing) and charters, excluding shore shellfish gatherers and non-residents.	The study population includes French speakers' fishers over 15-year-old, intercepted in person during approximately 300 of fieldwork (ports, beaches, jetties) across metropolitan France during daytime sessions (weekdays, weekends, holidays). It includes shore anglers, boat anglers, and spearfishers of all experience levels, excluding those using private or uncharted entry points and charters.
Sampling frame	What is the sample frame(s) and the associated PSU?		- Sample frame: Recreational fishers registered on one of the app. - PSU: Individuals - contact information Note: The estimated number of fishers in 2017 and 2021 was very different so there is the doubt on which screening survey to use	Still designing Sample frame: All individuals French speakers engaged in recreational fishing activities and intercepted during the sampling period. PSU: Fishing sites (or site × day pairs) Fishing site areas will be standardized with uniform boundaries to ensure consistent sizing across all locations.
	Does the sampling frame adequately cover the target population?	Yes, through complementarity	The app-based frame captures a wide range of fishers, but overrepresents tech-savvy and regular/ very regular fishers. It underrepresents those without Internet access or low digital engagement. In theory, night-time and private-access fishers could join, as long as they have a phone and Internet connection.	Probabilistic sampling at public access points captures occasional and non-digital fishers. However, it omits night-time fishing activities and fishers launching from private or uncharted sites.

	Are there elements of the sample frame that have been deliberately excluded, and if so and what were they (e.g. quiet season)?	Yes / No	The panel design deliberately excludes shore shellfish gathering, non-residents and French overseas territories (out of scope) and only includes anglers with Internet access. All calendar months are covered—no "quiet season" exclusion.	Surveys are intentionally limited to daytime hours for safety and logistical reasons, thereby excluding night-time fishing. Private and uncharted launch sites and charters are also out of scope.
Stratification	Are the strata well defined, known in advance (spatial/temporal)?	Off-site: Yes On-site: On design	The strata are based on historical data (2021 and 2017) and is based on avidity, region, and type of fishing.	Spatial and temporal stratification criteria have been drafted (by region, site type, season, daytype), but the final strata definitions remain under development. Also, high and low activity strata will be defined.
	Is there adequate sampling within each stratum (e.g. days surveyed during weekend/summer)?	Off-site: Yes On-site: On design	Monthly recruitment targets monitored (e-mail; if no-response than call) to ensure a minimum number of participants per avidity, region and type of fishing	Sampling allocations across proposed strata (weekends vs. weekdays, summer vs. off-season) will be established once the stratification plan will be finalized.
Selection	Is sampling probability based (e.g. stratified random, PPS -Proportional to Population Size)?	Off-site: No On-site: Yes	Self-selecting diary, quota-based approach.	Uses stratified random sampling at selected sites.
	Has the survey been designed to achieve target precision in an analytically optimal fashion?	Yes	The sample size was determined to achieve a sufficient level of statistical precision	The sample size will be determined to achieve a sufficient level of statistical precision
	Have issues associated with ethics/ permits and privacy been addressed?	Yes	Ethical approval secured; GDPR-compliant handling of personal and location data; confidentiality of precise fishing sites maintained.	

IMPLEMENTATION

Fill the section below, IF

A. The survey has started, OR

B. The survey hasn't started but advice or assessment by ICES WGRFS is requested.

Check this box and skip the section(s) if the survey hasn't started and advice or assessment by ICES WGRFS is not required ☐

	QUESTION	ANSWER	OFF-SITE SURVEY COMMENTS (if not applicable, type NA)	ON-SITE SURVEY COMMENTS (if not applicable, type NA)
Selection	Has the survey actually followed the sampling design?	Unknown	Survey is still running.	Survey hasn't started yet. No trial is planned due to financial constraints.
	Have sampling protocols been documented and followed at each stage (selection of individuals, times, boats, biological samples)?	Ongoing	Sampling protocols for panellist recruitment are documented. The service provider tracks how each participant was recruited, distinguishing the entry points (e.g. online advertisement, e-mail campaign, QR code at a conference, etc.). This allows for an assessment of recruitment channels and their potential influence on panel composition.	Protocols are being developed but will be fully documented and standardized. This includes list of sites, timing of sampling, site areas/size measurements, and biological measurements. Documentation will also cover deviations and operational challenges (e.g. refusal to participate, language barriers).

	Have contingency protocols been specified to deal with issues such as incomplete interviews of un-surveyable weather and were they required?	Yes	If panellists do not have Internet access during their fishing session, they may enter their fishing report afterwards. Participants are encouraged to take a picture upon arrival and departure at the fishing site (to capture weather and time spent fishing), and picture of their catches to aid with later recall when filling out their diary. Missing diary entries were managed through reminder e-mails and calls.	A completion rate and non-response rate will be calculated each quarter, with reasons for non-response recorded (e.g. language barrier, refusal, other). Adjustments may be implemented to compensate for incomplete interviews or fieldwork interruptions due to weather. A shortened version of the questionnaire may be proposed to respondents in a hurry. For biological data collection, subsampling is planned when more than 30 individuals are caught during a single session (e.g. measuring every other fish until 30 are sampled). Recall bias considered – addressing incomplete trips with follow up text messages afterwards (e.g.).
	Has there been any major departure from the survey design (frequent refusal to take observers on board a charter vessel)?	Unknown	Ongoing.	Not started yet.
	Is there a language barrier (tourist fishery)?	Yes, probably	The mobile application used for data collection is only available in French, which excluded tourist fishery of this survey.	Not yet implemented Designed exclusively for French-speaking fishers.
	Have the planned number of sampling events and/or interviews taken place and have the completion rates been documented?	Yes	Yes, data collection is ongoing. The number of completed fishing diary entries and panellist participation rates are being closely monitored and documented.	Not yet started. Sampling events and completion rates will be monitored and documented once the fieldwork begins.
Nonresponse	What were the following non-response rates were relevant? - Screening – blocked contact - Screening – no reply - Screening – language problem - Panel survey – not contactable - Creel survey – refusal - Creel survey – language problem - Other	Unknown	Ongoing. The study is based on a self-selecting diary panel, with voluntary and ongoing participation. Monthly e-mail reminders are sent to participants to ensure that their logbooks are regularly updated. In the absence of a response, follow-up phone calls are made to confirm whether they wish to continue participating. Drop-out is actively monitored, and withdrawal rates are recorded throughout the study.	Not started yet.

Recall	What is the recall period and is it appropriate to the questions asked?	Yes	The recall period is managed through monthly e-mail reminders prompting panellists to update their fishing diaries (effort and catch). If a panellist does not respond, a follow-up phone call is made to understand any issues and propose solutions. Near real-time recording minimizes recall bias and is well suited for detailed effort and catch data.	Recall bias is minimal, as fishers are interviewed during or immediately after their fishing session. No follow-up is planned since interviews are conducted in real time – nonetheless, calling the fishers after fishing trip can be considered to allow for complete fishing trip data.
Effort	How is effort defined (unit, fishing mode, target species, location) and related to CPUE measures?		Effort is defined as the number of fishing sessions. For each session, panellists record location, start/end times, and optionally mode (shore, boat, and spearfishing) and gear.	Effort will likely be defined similarly, with the fishing session as the primary unit. Additional details (gear, mode, location) are expected to be collected during interviews
	Was the measure of effort clearly communicated to the fisher (i.e. time spent with gear in the water)?	Yes, but could be more precise	Panellists recorded session start and end times, but no guidance is provided to separate active fishing time (gear in water) from other trip activities.	Same as off-site: estimated session duration will be recorded, without explicitly distinguishing active fishing time. This limitation is acknowledged but considered acceptable given the recreational context.
	Is it possible to record incorrect fishing areas?	Off-site: Yes On-site: No	Panellists manually drop a pin on an interactive map in the app, which can result in inaccuracies (e.g. points placed inland). GPS validation possible if photo is provided, but not mandatory.	Efforts will be made to ensure accurate geolocation. Surveyors will be equipped with maps and trained to record reliable location data directly from fishers, reducing the risk of spatial error.
Catch	Is the retained catch verified by surveyors (e.g. all filleted, don't show)?	Off-site: No On-site: Unknow	The app-users community can moderate specific content shared between fishers (for example, if a species is misidentified). The sub-contractors (FishFriender and EUREKA MER) are also responsible for reviewing the overall reliability of the data and for identifying any missing information.	Not started yet
	Is species identification and naming reliable?	Off-site: No On-site: Unknow	Species identification is based on self-reporting by panellists, which can lead to misidentification. However, reliability is improved through multiple supports: - Panellists can upload photos of their catches. Although not mandatory, photos are shared on the app's social platform, where community feedback can help identify or correct species. - A species identification guide featuring common marine fish is provided in the app to support users in naming species accurately. - During data analysis, checks will be carried out to flag implausible or rare species reports, supported where possible by photo verification when available.	Species identification is expected to be reliable, as surveyors will be members of recreational fishing federations. They will receive identification guides for the main marine species, and will also undergo dedicated training sessions on species recognition to ensure consistency and accuracy in data collection.
	Is there a clear division between fish kept and fish released?	Yes	App requires users to explicitly indicate for each capture whether the fish was kept or released. This step is mandatory to validate the entry.	The current protocol plans to include this distinction by asking fishers during interviews whether each catch was kept or released.

	Is it possible that an individual will have also reported the catch of those fishing with them?	Off-site: Yes On-site: No	Protocol explicitly instructs participants to report only their own catches, but it cannot be guaranteed.	To ensure clarity and consistency, it is planned to include a specific question asking whether the catches reported are exclusively those of the respondent, in order to avoid duplication or overestimation.
	Is there a digit preference in the reports (catch numbers and/or length frequencies)?	Yes, for fishing days, no for catches	There is rounding in the numbers of days fished, but not for the number of fishers.	On design
ANALYSIS and REPORTING (fill out if the survey is complete) Check this box if not applicable ☒				
	QUESTION	ANSWER	OFF-SITE SURVEY COMMENTS (if not applicable, type NA)	ON-SITE SURVEY COMMENTS (if not applicable, type NA)
General	Does the estimation procedure follow the survey design?	Not started		
	Has imputation been used to account for missing observations and, if so, is the procedure documented?	Not started		
	Has there been weighting to correct for nonresponses/avidity bias	Not started		
	Has the precision of estimates been calculated and, if yes, how have they been calculated and where are they documented?	Not started		
	Were estimates estimated with acceptable precision.	Not started		
WGRFS ASSESSMENT on the SURVEY				
	Strengths		*The apps are already in use, so fishers are familiarized with them.* *There is a 3-step data reviewing process (FishFriender, Eureka Mer, and Ifremer).*	*It is being designed, and it is important to complement and validate the other off-site surveys*
	Weaknesses		*Number of Rec fishers is still not well known. There were two screening surveys with very different estimates on the total number of fishers.* *Non mandatory aspects of fishing mode, location and number of rods/fishers. To be included*	*No trial is planned due to financial issues. The group strongly suggests considering it.* *Fishing sites areas must be standardized, and boundaries create to have the same sizes across sites*
	Recommendations		*A screening survey should be developed to define the number of French recreational fishers. Using the national annual census could be an option to*	*A trial stage would be very useful and there is the need to standardize the fishing sites.*

		select which of the 2 developed screening survey should be used. *Some assumptions will be needed to deal with data already collected when analysing data because of the non-mandatory option of fishing mode, location, and number of fishers and rods - FishFriender*	
Off-site: The CatchMachine app is mandatory in the mediterranean for MPAs (since 2023) and the FishFriender app is popular in France and was already used for other surveys in 2020–2023. Some features will be included to improve data collection (mandatory location and fishing mode), but the apps are already retrieving data triple checked. Pannel has started and fishers are graded according to the quality of reported data and consistency of reported fishing trips (they receive a monthly e-mail to reply on "is your app updated'" and "If not, what did you forget to say"), if grade is below the minimum required, then fishers are discarded from the panel. *The on-site is still on design, but all recommendations will be used for this stage and for the implementation stage.* *Data analysis will be reviewed by this group after initiating the analysis.* *Survey is highly robust and accommodates all foreseen questions. It has a robust 2 app off-site component, and an on-site component being designed to accommodate all recommendation provided during the QAT assessment. Data analysis will be reviewed upon start.*			

Netherlands

SHORT DESCRIPTION OF THE SURVEY (main objective, scope, and key details on sampling approach and implementation stage)	
This national survey aims to estimate catch and effort in marine and freshwater recreational fisheries among residents of the Netherlands. The target population includes all Dutch recreational anglers (i.e. it does not consider tourists and non-residents, and there is a separate survey for gillnetters). The survey employs a two-stage sampling approach: (1) an initial screening survey (based on a database from a panel market company) collects information on fisher demographics and participation to define angler population; (2) a logbook survey in which participants record their fishing activity, including fishing trip characteristics (e.g. duration), catch by species, and release information. The study covers all marine and inland waters within Dutch territory and aims at generating national-level estimates of effort, catches (in particular for the species under the EU DCF), and catch-per-unit-effort for the main fishing modes. The survey is conducted biennially and started in 2009. The most recent screening survey was conducted in December 2023, and the latest logbook data collection took place between March 2024 and February 2025.	
Objective(s)	Obtain catch and effort estimates for marine and freshwater recreational fisheries resident in the Netherlands
Target population	Dutch marine and freshwater recreational fishers
Sampling approach	Two stage sampling: I – screening: one time questionnaire to obtain information on the fishers population II – logbook survey: monthly catch reporting
Scale	national
Fishing modes	Angling and gillnet
Stage	Every other year (8 times completed)
Country presentation (yes / no)	yes

DESIGN				
	QUESTION	ANSWER	OFF-SITE SURVEY COMMENTS (if not applicable, type NA)	ON-SITE SURVEY COMMENTS (if not applicable, type NA)

Target population	Have all components of the target population been identified?	No	Tourists and non-residents are not included. Also, only anglers are included, but there is a separate gillnet survey	NA
	Is there a component of the target fishery that is not covered by the survey and if so, what was it?	Yes	Non-residents and tourists Residents without Internet (but that is neglectable nowadays)	NA
	Are there elements of the target population that are not accessible, and if so, what are they (e.g. private access points or unlisted telephone numbers)?	Yes	Non-residents and tourists, due to the survey method.	NA
	Study population			
Sampling frame	What is the sample frame(s) and the associated PSU?		A large database with respondents maintained by a commercial market agency. Respondents are not allowed to register themselves. PSU = anglers in this database We also recruit fishers to join the logbook survey on recreational websites, social media, and in local newspapers. PSU = resident anglers in the Netherlands.	NA
	Does the sampling frame adequately cover the target population?	Yes / No	We assume it does. However, the database might be biased (towards people who have more time to fill in questionnaires). High avid fishers may be underrepresented	NA
	Are there elements of the sampling frame that have been deliberately excluded, and if so and what were they (e.g. quiet season)?	Yes	Non-residents and tourists. Gears other than rods	NA
Stratification	Are the strata well defined, known in advance (spatial/temporal)?	Yes	Spatial: the whole coastal area for marine and all inland water for freshwater. Temporal: logbook participants are supposed to join for the whole year Avidity: number of yearly fishing trips	NA

	Is there adequate sampling within each stratum (e.g. days surveyed during week-end/summer)?	Yes / No	Yes: all trips and catches are registered for a whole year. The sampling size (number of marine fishers) could be larger especially with high avidity anglers	NA
Selection	Is sampling probability based (e.g. stratified random, PPS -Proportional to Population Size)?	Yes / No	To join the database from the market company is probability based and weighting is applied to correct for deviation in the Dutch demographics in the population (sex, age, education, income etc.). All fishers from the database are selected for the logbook survey, however, not all want to join. The participants of the logbooks are therefore not necessarily representative for the angler population. There is weighting to correct for (stated) avidity and water type, but not for other demographics, as the number of anglers that join is too low to correct for all factors.	NA
	Has the survey been designed to achieve target precision in an analytically optimal fashion?	No	No: the goal is to get information from as many fishers as possible.	NA
	Have issues associated with ethics/ permits and privacy been addressed?	Yes	The commercial market company has access to the names and addresses, we (WMR) do not have access.	NA
IMPLEMENTATION *Fill the section below, IF* *C. The survey has started, OR* *D. The survey hasn't started but advice or assessment by ICES WGRFS is requested.* *Check this box and skip the section(s) if the survey hasn't started and advice or assessment by ICES WGRFS is not required* ☐				
	QUESTION	ANSWER	OFF-SITE SURVEY COMMENTS (if not applicable, type NA)	ON-SITE SURVEY COMMENTS (if not applicable, type NA)
Selection	Has the survey actually followed the sampling design?	Yes	Yes, but we would like more fishers to join.	NA
	Have sampling protocols been documented and followed at each stage (selection of individuals, times, boats, biological samples)?	Yes / No	Ideally all logbook participants would be selected from the screening survey. At the start of the first surveys, this was possible, but as the database from the market company declined, and only a proportion of anglers from the database wanted to join the survey we had to recruit participants from other sources (e.g. the angler organization, social media and fishers websites), especially for marine water.	NA
	Have contingency protocols been specified to deal with issues such as incomplete	No	In the screening this is corrected with applying weighting factors. For the logbooks we ask the participants to register all trips for a	NA

	interviews of unsurveyable weather and were they required?		year and to let us know if they didn't fish for a month.	
	Has there been any major departure from the survey design (frequent refusal to take observers on board a charter vessel)?	No		NA
	Is there a language barrier (tourist fishery)?	No / Unknown	Tourist fishers are not included in the survey.	NA
	Have the planned number of sampling events and/or interviews taken place and have the completion rates been documented?	Yes/No	At the start in 2009 yes, but in recent years we have found it more difficult to recruit enough marine fishers. At present we do not plan the number of marine fishers that can join the logbook survey, but every marine fisher who is willing to keep a logbook for a year is welcome to join the survey. Completion rates have been documented.	NA
Nonresponse	What were the following non-response rates were relevant? - Screening – blocked contact - Screening – no reply - Screening – language problem - Panel survey – not contactable - Creel survey – refusal - Creel survey – language problem - Other	Yes / No / Unknown	Screening: unknown but supposed to be irrelevant due to: 1) weighting for demographic characteristics afterwards; and 2) omnibus survey quitting is not related to recreational fisheries. An omnibus survey is a survey where questions are embedded in questions about other topics (e.g. first about shampoo, then rec fish and then politics). Only respondents completing all questions are included. Logbook: In the logbooks, the respondents are expected to report their catches every month. Respondents who reported 8–12 months are included in analyses. In 2022 in marine water about 9% was excluded due to non-response (less than 8 months reported)	NA
Recall	What is the recall period and is it appropriate to the questions asked?	Yes	Screening: 1 year, but this is used only for the definition of 'being a fisher'. It is assumed that bias is probably low because we do not use the number of fishing trips from the screening survey, only if they fished at least once in the previous year. Logbook: in theory 0 (fill in logbook at the fishing trip), but maximum 1 month (if they fill it in when they need to supply it to the market company)	NA

Effort	How is effort defined (unit, fishing mode, target species, location) and related to CPUE measures?		We know the effort (yearly number of trips, including trip duration (begin and end time), but we do not use it for raising the data and have not estimated the total effort in number of trips or time spent fishing. We use yearly total catches per fishers to raise the data and not effort in term of number of trips or time spent fishing. So CPUE in our case is catch/fishers/year	NA
	Was the measure of effort clearly communicated to the fisher (i.e. time spent with gear in the water)?	Yes	In the logbooks the start and end time and date of trip and number of gears (rod's) used. In the screening we ask for the number of trips in the last year, however we do not use this in raising, only as a stratum for weighting (we call it weighting for 'stated avidity', realizing this could be a biased estimate).	NA
	Is it possible to record incorrect fishing areas?	Yes	Yes, location is by clicking in google maps. However, we do not use location for raising to total catches and fishing effort.	NA
Catch	Is the retained catch verified by surveyors (e.g. all filleted, don't show)?	No	No, based on self-reported data.	NA
	Is species identification and naming reliable?	Unknown	There is a drop-down list with the most common species (and an open field for other species). However, we cannot check if it is correct.	NA
	Is there a clear division between fish kept and fish released?	Yes		NA
	Is it possible that an individual will have also reported the catch of those fishing with them?	Unknown	Clearly stated that they should only report their own catch, but the reliability of the self-reported information was not checked.	NA
	Is there a digit preference in the reports (catch numbers and/or length frequencies)?	Yes	We ask if the length measures are really measured or estimated. In the estimated data, there is a digit preference in length.	NA
ANALYSIS & REPORTING (fill out if the survey is complete) Check this box if not applicable ☐				
	QUESTION	ANSWER	OFF-SITE SURVEY COMMENTS (if not applicable, type NA)	ON-SITE SURVEY COMMENTS (if not applicable, type NA)
General	Does the estimation procedure follow the survey design?	Yes		NA

	Has imputation been used to account for missing observations and, if so, is the procedure documented?	Yes	We have a non-response survey at the end of the logbook survey where we ask if they fished in the months where there was no reporting. If they did not fish, they get a 0 catch, if they did, they get their own average monthly catches of the other months. Everyone who has filled in their survey at least 8 months is included.	NA
	Has there been weighting to correct for nonresponses/avidity bias	Yes	Yes, we correct for stated avidity. In the screening it is asked how many fishing trips were made in the year before. These are labelled 'stated avidity' and used as a stratum in the raising of the logbook survey.	NA
	Has the precision of estimates been calculated and, if yes, how have they been calculated and where are they documented?	Yes	Yes, bootstrapping, documented in reports.	NA
	Were estimates estimated with acceptable precision.	Sometimes	This depends on species and year. In most estimates in marine water, the precision is low (high confidence intervals)	NA
WGRFS ASSESSMENT on the SURVEY				
	Strengths		This survey forms part of a long-term monitoring program and has already been conducted eight times. As a result, the resident angler population should be relatively well characterized, although no formal fishing licenses exist for MRF. The complementary survey approach, using a screening survey to gather information on the overall angler population and logbooks to collect catch and effort data at the fishing trip level, aligns with general recommendations for large-scale recreational fishing surveys.	NA
	Weaknesses		There is some uncertainty regarding whether the database used in the screening survey accurately represents the Dutch marine and freshwater angler population. The currently small number of MRF participants in the logbook survey may affect representativeness and introduce avidity bias and thus increase uncertainty in the estimates of catch and effort.	NA

	Recommendations	A one-time offsite survey targeting the entire Dutch population should be considered to update estimates of participation rates in recreational angling and assess the reliability of the database currently used in the monitoring program (maintained by the commercial market agency). In parallel, every few years, an onsite survey could be conducted, to obtain information on catch and effort and compare it to the information obtained from the fishing logbooks. This approach would help identify and correct for potential coverage or recall bias in the logbook data. Additional measures should be explored to increase participation in the MRF logbook program, such as workshops, training programs, or targeted incentives. It is also important to evaluate whether avidity bias exists within the MRF panel, particularly given recent trends of decreasing participation in the logbook surveys, which may result in a panel increasingly composed of more avid anglers.	NA
Conclusions: *The Dutch national recreational fishing survey is a well-established monitoring program (in place since 2009, and conducted every two years), which has been providing long-term estimates of catch and effort across both marine and freshwater systems. Its two-stage design (combining a screening survey to determine participation rates and characterize the angler population, with a logbook survey to obtain specific fishing trip and catch data) ensures a structured approach in line with general recommendations for large-scale recreational fishing surveys. However, the small number of MRF participants in the logbook survey may affect representativeness, providing estimates with a low precision, and therefore increasing uncertainty in the estimates of catch and effort. In addition, periodic onsite surveys could complement logbook data by validating catch and effort estimates and helping to detect and correct coverage. Finally. efforts to promote engagement among anglers (e.g. better outreach, incentives, or training programs) could increase participation in the logbook survey and decrease potential avidity and representativeness bias alongside increasing precision.*			