WORKING GROUP ON RECREATIONAL FISHERIES SURVEYS (WGRFS)

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International Council for the Exploration of the Sea
Conseil International pour l'Exploration de la Mer

H.C. Andersens Boulevard 44-46
DK-1553 Copenhagen V
Denmark
Telephone (+45) 33 38 67 00
Telefax (+45) 33 93 42 15
www.ices.dk
info@ices.dk

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Editors

Estanis Mugerza • Kieran Hyder

Authors

Adam Lejk • Alexander Winkler • Amélie Régimbart • Anastasios Papadopoulos • Anders Kagervall
Anna-Marie Winter • Annica de Groote • Antanas Kontautas • Branko Dragicevic • Christian Skov
Chun Chen • Chris Bova • Dace Zilniece • David Vertegaal • Diarmuid Ryan • Didzis Ustups
Eneko Bachiller • Estanis Mugerza • Evanthia Karasavva • Filipa Duarte • Filipe Freitas Henriques
Freya Ivy Palmer • Grace Farrell • Hannah Rudd • Hans Jacob Olesen • Harry Vincent Strehlow
Henrik Pärn • Hugo Diogo • Joana Patricio • João Pontes • John Foster • Jules Selles • Karina Ryan
Keno Ferter • Kieran Hyder • Krzysztof Radtke • Lara Salvany • Leonardo Venerus • Leonie O'Dowd
Luca Bolognini • Mafalda Rangel • Marc Simon Weltersbach • Marta Pujol-Baucells • Martín García
Asorey • Martín Laporta • Martin Mortensen • Martin Wiech • Martina Scanu • Matthew Farthing
Miikka Husa • Mišo Pavesi • Paz Jiménez • Pablo Pita • Paul Venturelli • Pedro Veiga • Pentti Moilanen
Qilei Zhao • Sabrina Colella • Samantha Hook • Samira Nuñez • Sean Tracey • Stephen Taylor
Thomas Lanssens • Thomas Verleye • Valerio Sbragaglia • Warren Potts • Wendy Edwards
Zachary Radford

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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 2024, WGRFS undertook a wide range of activities focused on MRF, including the consolidation and assessment of national survey programs, the validation of novel methodologies, and the provision of guidance regarding data availability, quality, and use. Additional responsibilities included facilitating regional data collection and storage, exploring human dimensions of MRF, and conducting assessments of workshops hosted by the group. These sessions emphasized information exchange, national survey program evaluation, intersessional activities, and strategies for scientific publication.

Discussions covered a diverse set of topics, such as the launch and outcomes of new national survey initiatives across various regions, including China, Sweden, Azores, Croatia, and Australia. Updates on MRF were also provided by the European Commission and angling community representatives. Findings from the Regional Coordination Groups were shared, along with approaches to include MRF in assessment and advisory processes. ICES have been tasked with providing advice on MRF, so an ICES roadmap has been developed giving key recommendations. MRF can be important as a food source, so the impact of this for food safety and human health was considered.

The core focus of the meeting centred on evaluating progress, developing strategies, and the intersessional groups (ISGs). The ISGs are the primary mechanism for WGRFS activities addressing areas including governance, survey methodology, quality assurance, regional coordination and data storage, catch-and-release practices, animal welfare, stock assessment and reconstruction, novel methods, human dimensions, and communication and engagement. Given the extensive scope of discussions and outcomes, a comprehensive summary is not possible here; however, detailed information is presented in the main text.

ii Expert group information

Expert group name	Working Group on Recreational Fisheries Surveys (WGRFS)
Expert group cycle	Multiannual fixed term
Year cycle started	2023
Reporting year in cycle	2/3
Chairs	Kieran Hyder, UK
	Estanis Mugerza, Spain
Meeting venue and dates	3–7 June 2024, Horta, Portugal (Faial Island, Azores; 00 participants)

1 Introduction

Working Group on Recreational Fisheries Surveys 2024 report

1.1 Terms of reference[1]

Term of reference	Addressed in this report
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
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
Provide guidance to 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
Develop approaches for regional data collection programmes that generate robust data for end-users and support the ICES TAF and ecosystem approach.	Yes
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
Review outcomes of the workshops organized by the 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 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 inclusion of recreational fisheries in stock assessment using data from the pilot studies. (a, c, d) Develop ICES workshop proposal with WGCATCH for integrating probabilistic and non-probabilistic surveys. (b) Create 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 WGRFS ToRs can also be found in Annex 2 of this report.

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 stakeholders 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 stakeholders 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 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 improved national approaches. (b)
	Assess the potential for impact of climate change on species caught by recreational fisheries and how that could impact on DCF and regional species requirements. (c, d)
	Develop 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 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 surveys are carried out across Europe covering a range of species and areas. In EU Member States (MSs), all species and areas are required under the DCF EU 2017/1004/EU, 2021/1167/EU) and Control Regulation (EC 1224/2009, EC 2023/2842) are covered. These relate solely to surveys of recreational fishing 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 provided by China, Sweden, Azores, Croatia, and Australia.

2.2 Perspectives from end-users

2.2.1 European Commission update

DG MARE: Joana Patricio, Leonie O'Dowd, and Martin Chemnitz Mortensen

DG MARE gave the latest update on: 1) Revised fisheries control system; 2) The Commission proposal for the electronic reporting system; 3) EU proposal for the IT system; 4) Data collection; 5) GFCM measures on recreational fisheries; and 6) CFP.

2.2.1.1 Fisheries control system – new Article 55

The revised fisheries control regulation came into force on 9 January 2024. The next step is implementation, which will come following various timelines (2 years, 4 years or 2029/2030). Recreational fisheries are mainly regulated by Article 55 of the revised Control Regulation[2]. The Commission explained the rational 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.

According to Article 55, MSs had to decide if they were going to use their own electronic system for the registration of recreational catches or if they were going to ask the Commission to develop an IT system by 10 May 2024. Nine MSs requested that the Commission develop the system that needs to be in place and operational within 2 years of publication (by January 2026). For species, stocks or groups of stocks under EU conservation measures, fishers will have to report their catches electronically and daily (Article 55(3a)).

According to Article 55(2), for additional species, stocks or group of stocks for which fishing opportunities are set by the Union, which are covered by a multiannual plan, or which are subject

[2] 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

to the landing obligation, MSs need to collect data (according to a method of their choice) to understand the impact of recreational fisheries on the overall fish stock. These data will need to be shared with the Commission, at least once per year.

Moreover, Article 55(3b) requires that, from January 2030, certain species, stocks, or groups of stocks for which scientific advice from STECF, ICES, or an equivalent body indicates that recreational fisheries are having a significant impact on fishing mortality, will also be subject to daily electronic catch reporting. The Commission highlighted that the Control Regulation requires the registration for fishers catching species subject to Union conservation measures. However, the Control Regulation does not require registration (neither authorization nor licensing) of recreational vessels, unless there are specific regulations at international level (e.g. ICCAT) that apply to recreational vessels that are targeting certain species. The revised Article 55 establishes, that the Commission *may*, by way of implementing acts, adopt detailed rules on:

- Submission of catch data collected by coastal MSs (under paragraphs 55.2 and 55.3).
- List of species, stocks or group of stocks.
- Frequency of recording and reporting of catches.
- Marking recreational fishing gear (excluding hand-held gear).

2.2.1.2 The Commission proposal for the electronic reporting system

2.2.1.2.1 Proof of concept phase

The Commission explained that the starting point for the new EU-wide catch reporting system for recreational fisheries is RecFishing (https://recreational-fishing.ec.europa.eu/). The proof of concept (PoC) was developed in two phases (2019–2020 and 2022–2023). The Commission shared the main features of the PoC The PoC was developed to test the idea of having multiple mobile solutions feeding a common EU central server. Two commercial solutions (FishFriender and Fangstjournalen) were used to test the model and architecture. The PoC has also a number of useful dashboards and data can be downloaded in various formats (excel and csv). The data are aggregated (and anonymised) and users have different profiles (control, scientist etc.).

The current PoC is based on a voluntary signup model and is not designed for mandatory use. The central system has been built by the Commission, but the fishers' mobile application and intermediate server need further development. Additionally, new functionalities are required (e.g. registration, gear marking, advanced geolocation features, data validation by MSs, new data visualization tools etc.), resilience features need to be added, and the system must be adjusted to handle high traffic.

2.2.1.2.2 The EU proposal for the IT system – scaling up RecFishing

The Commission presented the EU proposal for the electronic catch reporting system at EU level. The new RecFishing architecture supports three options for MSs to fulfil their data reporting obligations: 1) use of commercial solutions already in the market; 2) use their own system interfacing with EU servers; or 3) request the Commission to build an electronic system (with a Fisher's mobile application offered as a service).

To support scaling up and relocating RecFishing to the Commission IT environment, developing a fisher's mobile application, establish protocols to connect with MS applications for data submissions, and ensure operations, maintenance and MS support, the Commission will launch an

open call for tenders before summer and informed that the contract service will have a duration of 3 years.[3]

Additionally, the Commission is working closely with MSs, discussing the detailed implementing rules for recreational fisheries. To support this process, the Commission created the Working Group on Recreational Fisheries, which held its first meeting in June 2024. The Commission is also consulting relevant stakeholders (anglers, scientists, advisory councils etc.) on specific topics such as data fields, the level of aggregation for data submission, the list of species, stocks or group of stocks to be covered, data quality checks, data validation features, and the marking of passive fishing gear. The Commission emphasized the importance of the ICES WGRFS in this process.

2.2.1.3 Data collection

A short recap was provided on the DCF requirements arising from the EUMAP[4]: Regular sampling on recreational fisheries is compulsory (no more pilot studies), with emphasis on multi-species 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 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.

Last year, DG MARE informed WGRFS about the sampling plans of MSs under the current EUMAP, which include complementing surveys (large-scale and targeted) with reporting, their methods used and aspects of biological sampling. MSs are now reporting on their 2022+ workplans. The first related annual reports were evaluated in June 2023 and the full evaluation grids by MSs including recreational fisheries are published by STECF[5]. The 2023 Annual Reports have just been submitted and will be evaluated by STECF next week. The experts will look at whether MS have implemented what they planned in their National Work Plans (NWPs) and if it fulfils legal requirements. The data transmission is also evaluated by this expert group and should include any severe issues arising from the WGRFS data call.

Most MS submitted NWPs for 2022–2024 and all MS are expected to resubmit updated NWPs in October 2024 for 2025–2027. The new elements expected are: a) updates to their NWPs (any remaining pilot studies should change to core sampling; new test studies can be added); b) agreed regional Work Plans need to be taken into account in NWPs; c) previous STECF comments need to be reviewed and acted on to improve data collection; and d) actions arising from the Marine Action Plan (MAP). The MAP requires improved bycatch monitoring, and explicitly refers to data collection from recreational fisheries, including recreational fishing boats.

Regional coordination of data collection is active through the work of the regional coordination groups (RCGs). All RCGs have agreed on regional work plans (RWPs). Their activities on recreational fisheries included:

RCG Mediterranean and Black Sea:

- Follow methodologies described in the "Handbook for data collection on recreational fisheries in the Mediterranean and the Black Sea." FAO, 2021 (GFCM).

[3] Following the meeting, the call for tenders was launched with the deadline for offers being submitted by September 16, 2024.

[4] Delegated Decision (EU) 2021/1167 and Implementing Decision (EU) 2021/1168 (OJ L 253, 16.7.202)

[5] See STECF 23-08 Data Collection Framework reports - European Commission (europa.eu)

- Online workshop on recreational fisheries (29 June 2023) concluded a list of species by subregion and the need to record encounters with vulnerable species.
- 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 samplings (non-binding), using standardized protocols.

RCG North Atlantic, North Sea and Eastern Arctic and RCG Baltic:

- Regional Work Plan – no agreement on species list yet, inclusion of the marine recreational fisheries data in the RDBES (Regional Data Base Estimation System).
- Case studies for regional sampling plans – North Sea sea bass.
- Workshop on Recreational Fisheries in Stock Assessment.

RCG Large Pelagics:

- No activities on recreational fisheries agreed in the Regional Work Plan, any EU recreational fisheries on large pelagic fall under this RCG.

The Commission also summarized the successful project awards under SAF (scientific advice for fisheries) and encouraged participants to regularly review the CINEA Call site for future opportunities: Calls for proposals - European Commission (europa.eu).

2.2.1.4 GFCM measures on recreational fisheries

The Commission highlighted that GFCM in 2024 was launching a research programme on recreational fishing and a "regionalisation" process to define key management measures for each GFCM subregion. The Commission also reminded WGRFS that the GFCM was the first RFMO to adopt dedicated management measures and minimum standards for the management of recreational fishing with the adoption of recommendation GFCM/2022/12.

2.2.1.5 Common Fisheries Policy

The Commission drew the attention of WGRFS to the annual communication and the evaluation of the CFP. This evaluation is going to assess whether the general objectives of ensuring that fisheries and aquaculture are environmentally sustainable and managed in a way that is consistent with the objectives of achieving economic, social, and employment benefits.

2.2.2 Regional Coordination Groups

The overall aim for the Regional Coordination Groups (RCGs) is to review the current issues, achievements, and developments in regional coordination, and identify future needs for the DCF (EU 1004/2017) and wider European environmental monitoring. The RCGs are composed of members of the European Commission, the National Correspondents and researchers (biologists, economists, etc.) from the different MSs Several Intersessional Subgroups (ISSGs) were created within the RCGs that aim to respond to specific issues related to the DCF. Of most interest to this group is the Recreational Fisheries ISSG.

In recent years, the importance of the different Regional Work Plans (RWP) has been highlighted, which include MRF. The tasks covered within the RWPs are:

- Agree objectives based on end-user needs.
- Integrate regional sampling design.
- Standardize sampling protocols.
- Create a common approach for quality assurance.
- Generate regional tools for the management and dissemination of data.

All these aspects need to be developed before a regional sampling plan can be implemented.

One relevant issue in the process to further develop RWPs is the identification of potential case studies. The Northern Sea bass and the cod stocks in the western Baltic Sea and the Northern shelf were initially agreed as MRF case studies. Under the assessment of these stocks, MRF data are being used and some first attempts of coordination have been carried out. This will start with these candidate species/stocks over the next few years with coordination between scientists from the MSs that exploit these species/stocks under the umbrella of the RCGs and in close collaboration with the WGRFS experts.

WGRFS continues to work on a list of priority species to be considered in routine surveys in addition to the species that are mandatory to collect data within the DCF. The objective is to present a final list of species, explaining the methodology used for this purpose in 2025 RCGs annual meetings. It is important to note that WGRFS continues to recommend multispecies surveys, as the added cost and effort of collecting this information is not significant.

2.2.3 Recreational fishing community

2.2.3.1 European Union

MRF in the European Union is regulated under the Common Fisheries Policy. Although the number of regulations targeting or influencing recreational fisheries used to be very limited, the last years have seen an increase in regulations or measures that affect fishers such as bag limits and seasonal closures.

The European Anglers Alliance (EAA) does not view a more ambitious management as problematic *per se*, if such management is based on reliable data and goes hand in hand with rights equal to other users of the fish resource under the CFP. Under such terms, the EAA would generally welcome the inclusion of recreational fishing. EAA is not alone in seeking fair policy for recreational fisheries. Three EU advisory committees have indicated that recreational fishing deserves full recognition in the European Union's Fisheries Policy. The revised Control Regulation of 22 November 2023 is the latest regulation that seeks to further manage recreational fisheries. Part of it is that marine recreational fishers will be expected to record catch data from their fishing trips starting in 2026 for species such as sea bass and cod. Such catch registration will go accompanied with a registration of marine recreational fishers themselves.

The EAA emphasizes that the socio-economic value of recreational fishing, which is very significant, needs to be considered to assess costs and benefits of recreational fisheries. For this, further research is needed to ensure a fair and balanced policy for the different CFP stakeholders as foreseen in article 17. Without such insights, management may focus on impacts only while discarding the economic value of recreational fisheries – focusing on restrictions, missing opportunities. Recreational fisher registration offers an excellent opportunity to obtain socio-economic data as well. Improved user access may further potentially benefit other research objectives, even outside recreational fisheries, will help in communication with and compliance of users.

At the same time, many developments, such as Brexit and wind at sea, change the reality of commercial fisheries. This influences fisheries communities and, given the strong traditional support for fisheries, goes hand in hand with political awareness of the socio-economic consequences at European and Member States levels. Specific financial provisions have been instituted while STECF is increasing socio-economic research of fisheries. Regarding the latter, it has been acknowledged that the national fisheries profiles that STECF relies upon for reporting needs better data on recreational fisheries. Currently, such data are very poorly represented in these reports. Raising such data can be supported by the EMFAF – if Member States choose to prioritize this work.

Challenges we see under the current scheme are the focus on self-declared target species – if fishers declare they don't fish for the species that the scheme aims for, no registration is required. This loophole makes it easy to avoid registration in practice, while hurting the opportunity side of data registration, e.g. on socio-economics, due to non-adoption and small numbers of participation. It's particularly unsuited for countries with a high catch prevalence of the registration target species. Where such species are largely absent, there may be some benefit to a focus on target species only. There, only a minority would be required to register catches under this rule, e.g. in the brackish waters of the Gulf of Bothnia. Regarding rule adoption, insight into the behaviour of fishers is key. Better insight into the varied motivation and satisfaction of the different types of fishers (social fisher, nature lover, catch/cook, competitive etc.) will help us understand them better. There's an important role for science to help discover what our fishers want – beside catching fish.

EAA sees the increased focus on recreational fishing as an indication of policymakers' acknowledgement of its importance. A holistic approach to data collection as laid out here may very well be a necessity to convince recreational fishers of the benefits of data collection – and with that, win their support and participation.

2.2.3.2 UK

Recreational sea fishing is a recognized stakeholder under the UK Fisheries Act (2020), with recreational catch and socio-economic data identified as a data gap across many Fisheries Management Plans. Concurrently, recreational data are increasingly important in ICES stock assessments and in informing fisheries' policy and management decision-making. While recreational anglers are strongly interested in data collection, scepticism and distrust in data collection remain significant barriers to engaging with the recreational sea angling community and obtaining high-quality data. This can lead to either no data collection or poor-quality data, which often results in adopting precautionary management measures, further exacerbating tensions with the sector.

Communication should be recognized as an integral element of any data collection project in collaboration with stakeholders, including the recreational fishing sector; however, it is often not adequately factored into research proposals or budgets. A lack of open, transparent, sustained communication on the progress and aims of a research project can often increase feelings of distrust within the community it aims to collaborate with and/or benefit rather than alleviate them. At the same time, managing stakeholder expectations and educational outreach designed to improve scientific literacy can be beneficial.

Engaging with the recreational sector on the value of data collection and its uses within policy and management can help strengthen trust in research. For example, highlighting the socio-economic value of recreational fisheries could lead to better fishing opportunities for the sector and a higher level of government investment in sea angling. Understanding angling interactions with the marine environment can also improve fisheries management, benefiting the recreational sector via sustainable fish stocks. Factoring in partnerships with communications specialists and/or angling organizations can support these roles within research projects and streamline engagement with the recreational angling community.

Collaborating with the recreational angling sector on data collection can not only improve its representativeness and lead to higher-quality data, but it can also strengthen the sector's buy-in into any management or policy decisions made based on the data. An example of this working well in practice is Fisheries Industry Science Partnerships (FISP), a funding scheme administered by the UK Government's Department of Environment, Food and Rural Affairs. Through collaborative research projects, FISP brings together scientists, regulators, fisheries managers, and the industry (recreational and/or commercial). These diverse projects range from nationwide onsite

recreational surveys (Catchwise – Substance, Cefas and Angling Trust) to fine-scale and broad-scale acoustic telemetry focused on the movements of recreationally important species and angling interactions around the south coast of England (Angling for Sustainability – University of Plymouth, Professional Boatman's Association, Natural England, Southern IFCA and Angling Trust). A case study for the Pollack FISP project is provided in Box 1.

Recreational anglers are strongly interested in engaging with scientists, particularly in socio-economic research. In the UK, recreational anglers and angling organizations increasingly recognize data's value and role in supporting the sector's sustainable development. Communication and transparency are integral to building fruitful partnerships with the recreational sector that result in high-quality data collection. Further collaborations, similar to the Fisheries Industry Science Partnership model, bringing together scientists, regulators, fisheries managers, and the sector to focus on plugging identified data gaps, are an exemplary approach.

Box 1: Pollack FISP: Co-development of evidence with the recreational charter boat sector to support UK wide conservation of pollack.

Authors: Hannah Rudd, Simon Thomas, Bryce Stewart, Kieran Hyder, Rebecca Nesbit, Thomas Stamp, Dave Uren and Emma Sheehan

For over a decade, recreational anglers, charter skippers and commercial fishers have raised concerns about the status of pollack off the southwest of England. Pollack is a recreationally and commercially important species in the region, with many fishing businesses dependent on it. Despite this importance, pollack is widely recognized as a data-limited species with relatively little known about its biology and ecology. Concern from the recreational sector inspired a consortium of recreational charter skippers to voluntarily begin gathering catch data on pollack, such as length and CPUE.

Funding provided by the UK government allowed a formal partnership – known as the Pollack Fishing Industry Science Partnership (Pollack FISP) - between recreational angling organizations and scientists in 2023 to build on this initial data collection. Pollack FISP is a two-year Fisheries Industry Science Partnership, funded by the UK government's Department for Environment, Food and Rural Affairs (Defra). It is led by the University of Plymouth in partnership with recreational angling organizations – the Professional Boatman's Organisation and the Angling Trust – and academic organisations – the University of York and the Marine Biological Association – with support from the UK government's Centre for Environment, Fisheries and Aquaculture Science (Cefas).

Pollack FISP focuses are twofold: to gather data to inform stock dynamics and to acoustically tag pollack to understand movement and site fidelity. The partnership is also utilizing angling records and interviews with both recreational and commercial fishers to reconstruct historical trends in pollack distribution and abundance.

Charter skippers are collecting biological data on pollack, including length and maturity, as well as stomach contents and otoliths which provide information on age and growth. To date, these data have been collected from 14,078 pollack on 716 charter trips throughout 2023 and 2024. These data will inform understanding of stock abundance, composition and recruitment. In addition, charter skippers have supported the deployment of 92 acoustically tagged pollack and innovation in overcoming barotrauma through the development of a release-cage system that lowers the fish back to the depth at which it was caught, allowing it time to recover before being released. Survival is at least 77% for fish tagged and then released using the cage.

A unique aspect of the project is that charter skippers are paid for their time as opposed to providing their time for free. This has helped to build trust and respect between collaborators.

Data from the project will support the development of UK Fisheries Management Plans and the ICES stock assessment for pollack in the English Channel and Celtic Sea. With recreational charter skippers leading the fisheries data collection, there will it is to be hoped to be stronger buy-in from the sector into subsequent fisheries policy and management decision-making. Pollack FISP is an example of the recreational angling sector driving change in fisheries science and management. It is also an example of the benefits of true partnerships with the recreational angling sector to gather data on poorly understood species.

2.3 Inclusion in ICES advisory processes

2.3.1 Roadmap for inclusion of MRF in stock assessment

MRF catches are often excluded from stock assessment, which may impact on the ability to manage stocks to within sustainable limits. This is the case in Europe, where few stocks include MRF catches (e.g. cod, sea bass), but there is a growing recognition of the need to embed MRF in fisheries management and advice. As a result, DGMARE have included the provision advice on MRF in the ICES grant agreement, and other ICES Member Countries have requested ad-hoc advice. As a result, WGRFS were asked to create an ICES roadmap for Marine Recreational Fisheries. The overarching goal of this roadmap is to guide the development of robust recreational fisheries assessments through data and methodological improvements, in line with current and future management needs.

A draft has been created by members of the WGRFS that provides a roadmap for embedding MRF within the ICES assessment and advisory processes. To embed MRF in ICES advice, a step-change in approach is needed. WGRFS has identified a way forward using 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 this has to be done **Y**early within the annual advice cycle (Figure 1). Twelve recommendations associated with the DAISY model are identified that provide a roadmap for provision of MRF advice by ICES.

Figure 1: DAISY model for inclusion of MRF in ICES advice (please note that this is a draft and may change when finalized).

The draft roadmap has been reviewed by ACOM and feedback was positive. The aim of this session was to introduce the roadmap to the broader WGRFS and seek feedback. Feedback from the groups was that the roadmap was sensible, and several suggestions were made for improvement. The next step was to provide the full text for review, so a draft was put on the SharePoint

and feedback requested. The feedback needs to be incorporated alongside the changes suggested by ACOM to create a final draft. This would need to be approved by ACOM before being published on the ICES website.

2.3.2 Workshop on Recreational Fisheries in Stock Assessment (WKRFSA)

The Workshop on Recreational Fisheries in Stock Assessments (WKRFSA) was held from the 3–5 July 2023 and chaired by Zachary Radford and Martina Scanu. It brought together experts in stock assessment and recreational fisheries with the aim to establish a process for integrating recreational fisheries (RF) data into stock assessments. The workshop addressed three questions: identifying obstacles to RF inclusion, creating a decision tree for RF data inclusion and reconstruction, and establishing criteria based on data quality and catch quantity. It had three sections: assessing where RF data fits in the assessment cycle, schematizing RF data reconstruction, and discussing blockers to RF inclusion. The outcomes from WKRFSA were shared with the WGRFS and are summarized below with the full report published on the ICES website (ICES, 2024).

A productivity-susceptibility analysis (PSA) is underway to identify species in ecoregions where MRF may impact stock sustainability. When a risk is found, MRF data should be included in stock assessments. Key challenges to incorporating MRF data involve data quality, communication, and resourcing issues. Specifically, there is a need for better data consistency, improved communication on data availability, and addressing gaps in knowledge and capacity. A flowchart-based framework was developed to integrate RF data into stock assessments, addressing data gaps and errors (see Figure 2). While progress was made in tackling challenges, some issues remain unresolved. Five future tasks were identified: enhancing ICES support for stock and RF communities, appointing an RF data coordinator, improving communication between WGRFS and assessment groups, prioritizing species through PSA, and providing standardized guidance for RF-specific advice from ACOM.

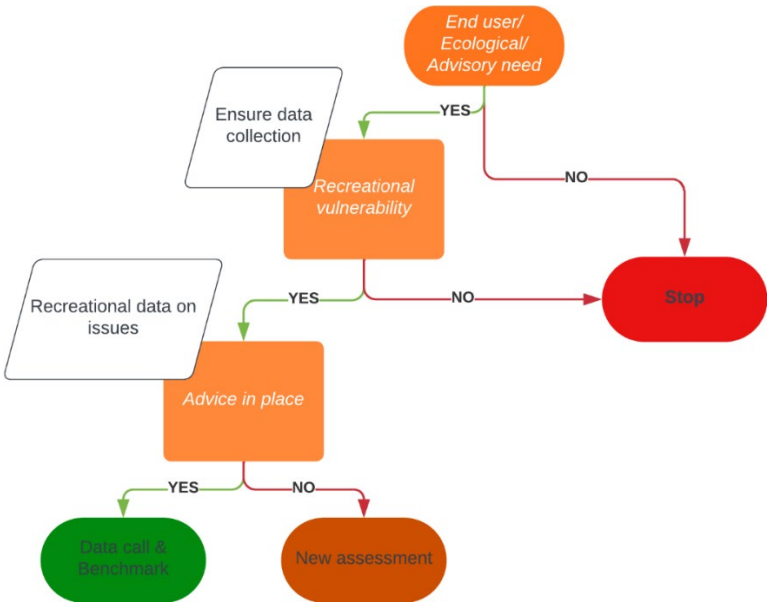

Figure 2: The initial steps for including recreational fisheries data into the ICES assessment and advisory process (reproduced from ICES, 2024).

2.3.3 Data calls and benchmarks

2.3.3.1 WGRFS data call

The scope of the WGRFS data call is to collect the most updated national MRF catch and effort estimates. A similar MRF data call was issued by ICES in 2023 (ICES, 2023), but response was limited. Through discussion with WGRFS members and chairs, it became clear that the recipients of the ICES data calls (ACOM and DCF national correspondents for ICES countries that belong to EU) are not necessarily the same for MRF and the national ACOM member was not aware of the institute/organization at the national level responsible for the collection of MRF data. ICES Secretariat, ACOM leadership, and WGRFS developed a questionnaire for ACOM to distribute to national experts to identify relevant contacts, organizations and data specifications and strengthen the links with the recreational fisheries community. ICES Secretariat presented the results of the questionnaire. 18 out of 19 countries (excluding Russia due to temporary suspension) responded the questionnaire and the information collected will be used among others to improve the distribution/ reach of the 2024 data call. The 2024 WGRFS data call will be issued after the WGRFS meeting, and the data received will be evaluated intersessionally by the regional coordination and data storage subgroup.

2.3.3.2 Benchmarks

ICES Secretariat also presented the list of stocks that have been approved by ACOM to be benchmarked in 2025 and to be used in the advice season 2026. This list was cross compared with the priority list based on the PSA developed by the WKRFSA to identify commercial fish stocks with higher recreational catch component. The stocks for benchmark in 2025 the potential for MRF to be an important component of mortality are:

- pol.27.67: pollack in Celtic Seas and the English Channel.
- ple.27.7d: plaice in eastern English Channel.
- turbot.27.4: turbot in North Sea.
- whg.27.7a: whiting in Irish Sea.

WGRFS members with expertise on these stocks were assigned to follow the benchmark process (data call, data evaluation workshop and benchmark workshop) and provide input on the recreational component.

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 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 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. Below is a summary detailing achievements and discussions within each group.

2.4.1 Governance

Leads: Fabio Grati and Kieran Hyder

In many parts of the world, MRF is not effectively embedded in fisheries governance, but there is increasing recognition of the importance of MRF and moves to include it more effectively in future (Arlinghaus et al., 2019; Potts et al. 2020). The role of the governance intersessional group is to consider how this could be done and support future integration. To support this aim, the governance session covered two topics: effective governance of MRF in Europe; and implementation of the control regulations.

Over the past two years, WGRFS has reviewed governance of MRF in Europe against a set of indicators of effective approaches identified (Arlinghaus et al., 2019; Potts et al. 2020). This assessment examined the current European fisheries governance, particularly the Common Fisheries Policy (CFP), in relation to managing MRF. Our analysis reveals that MRF is not explicitly recognized in European Union legislation, and recreational fisheries are either overlooked or inadequately managed within a policy framework focused on commercial fisheries. We propose policy reforms that specifically acknowledge recreational fisheries as a distinct sector with unique objectives and dynamics, separate from commercial fishing. At the operational level, we recommend including key organizations representing MRF interests in advisory groups addressing marine fisheries, nature conservation, and marine spatial planning. Additionally, we encourage the promotion of sustainable fishing practices across all sectors. Improved data collection, stakeholder engagement, and education are essential to support effective MRF management. By addressing these gaps, Europe can optimize the benefits of MRF while ensuring the long-term sustainability of its fisheries. A manuscript has been drafted of this analysis titled "Effective governance of marine recreational fisheries in Europe is needed to maximize its societal benefits" that is under review in ICES Journal of Marine Science. The discussion centred on the outcomes from the manuscript and seeking feedback that could be incorporated at the review stage. Generally, feedback was positive, with the outcomes supported alongside several suggestions for minor changes.

The second part of the session focused on the new EU Control Regulations. The Council Regulation (EC) 1224/2009 and the Control Regulation (EC) 2023/2842 establish a control and enforcement system for MSs to ensure compliance with the CFP management measures, applicable also to MRF. This system includes MRF licensing, electronic catch reporting, data collection of landed catch, and enforcement of management measures. Coastal MSs had to decide if they will use an electronic system developed at national or Union level by 10 May 2024. The electronic reporting must include MRF catches of species or stocks subject to Union conservation measures specific to recreational fisheries, such as quotas, catch limits and bag limits. Coastal MSs must register individuals involved in MRF and implement the electronic reporting system by 10 January 2026. Mandatory MRF catch reporting will be in place by 1 January 2030 for species or stocks under Union fishing opportunities, multiannual plans, or landing obligations, where scientific advice suggests significant impacts from MRF on fishing mortality. To address these requirements, the EC have developed a catch reporting system (https://recreational-fishing.ec.europa.eu/) and have set up a working group with the MSs to develop approaches for reporting.

The control system provides an opportunity to generate data alongside issues with respect to the quality of data provided. Opportunities include: a window to add to data collection especially where traditional survey methods have reached their limits; participation and empowerment in data collection opens new possibilities; more and better data on recreational fisheries covering the social, economic, and biological dimension will be possible; communicating requirements and expectations; and opportunities to strengthen environmental stewardship. However, there are also many threats including: a focus on minimum data collection requirements leading to fragmentation of data; incomplete registries of sea anglers due to a focus on few mandatory species; poor data quality; reducing participation and involvement of anglers in data collection; more data gaps due to MS relying solely on electronic catch reporting; empowerment in management is weakened; declining compliance through the rejection of top–down regulations; and

threats to funding of EUMAP MRF data collection. As the organizations that monitor catches under the EUMAP and control agencies responsible for the system are generally different, it is important to encourage interactions and discussions to share expertise and approaches.

A survey was run of WGRFS experts to understand the level of their interactions around and technical input into the control systems. In total, 18 responses were received from 12 MSs with a good geographic spread (Figure 3A). For the national registry, most knew the organization responsible, with 72% having discussed it with relevant organizations and 44% intending to create their own system (Figure 3B). For mandatory catch reporting, the relevant organization was the same as for the national registry, 83% have discussed with relevant organizations with 33% intending to create their own system and 28% intending to use the EC system. This highlighted that there has been some interaction between those implementing the control system and WGRFS members collecting data under the EUMAP, but more is needed (Figure 3C). WGRFS members were urged to reach out to their colleagues responsible for control to build these relationships.

The EC have asked for support from the WGRFS on this topic, so a discussion was had covering the challenges of the new control system, preparedness of the countries, and how WGRFS could support this process. The WGRFS felt it was important for the EC to ensure that the regulatory frameworks (Control Regulation, Data Collection Framework, and European Fisheries and Aquaculture Statistic Regulation) complement each other and provide better data. However, watering down the data requirements (e.g. incomplete registration of sea anglers, not specifying when to record catches) will create divisions and issues that will significantly impact on generating a coherent and holistic outcome. WGRFS suggest that the EC should:

- Add a central principle around robust and efficient data collection to ensure that data collected through the Control Regulation complements existing data collection mechanisms. This should ensure the most complete coverage of recreational fishers and their associated trip data to avoid costly population surveys.
- Amend Obligation #1 to ensure registration of all recreational marine fishers since unwanted bycatch of mandatory species applies to all sea anglers.
- Amend Obligation #2 to require catches to be recorded immediately after capture otherwise effective control is not possible.

A wide-ranging discussion was had with clear synergies and opportunities for collaboration between WGRFS and the EC. This could cover but not be limited to: improving data quality; increasing engagement with anglers; supporting collaborations between DCF and control communities; supporting data collection requirements including levels of aggregation and gears; and contributing to EC commission task force on the control system. The key outcomes were:

- WGRFS should request a list of species with requirements for data collection under Articles 5.2 and 5.3 from the EC.
- EC should invite experts from the WGRFS to support their task force on the MRF control system.

Further discussions will be instigated between key WGRFS experts and the EC to move this area forwards.

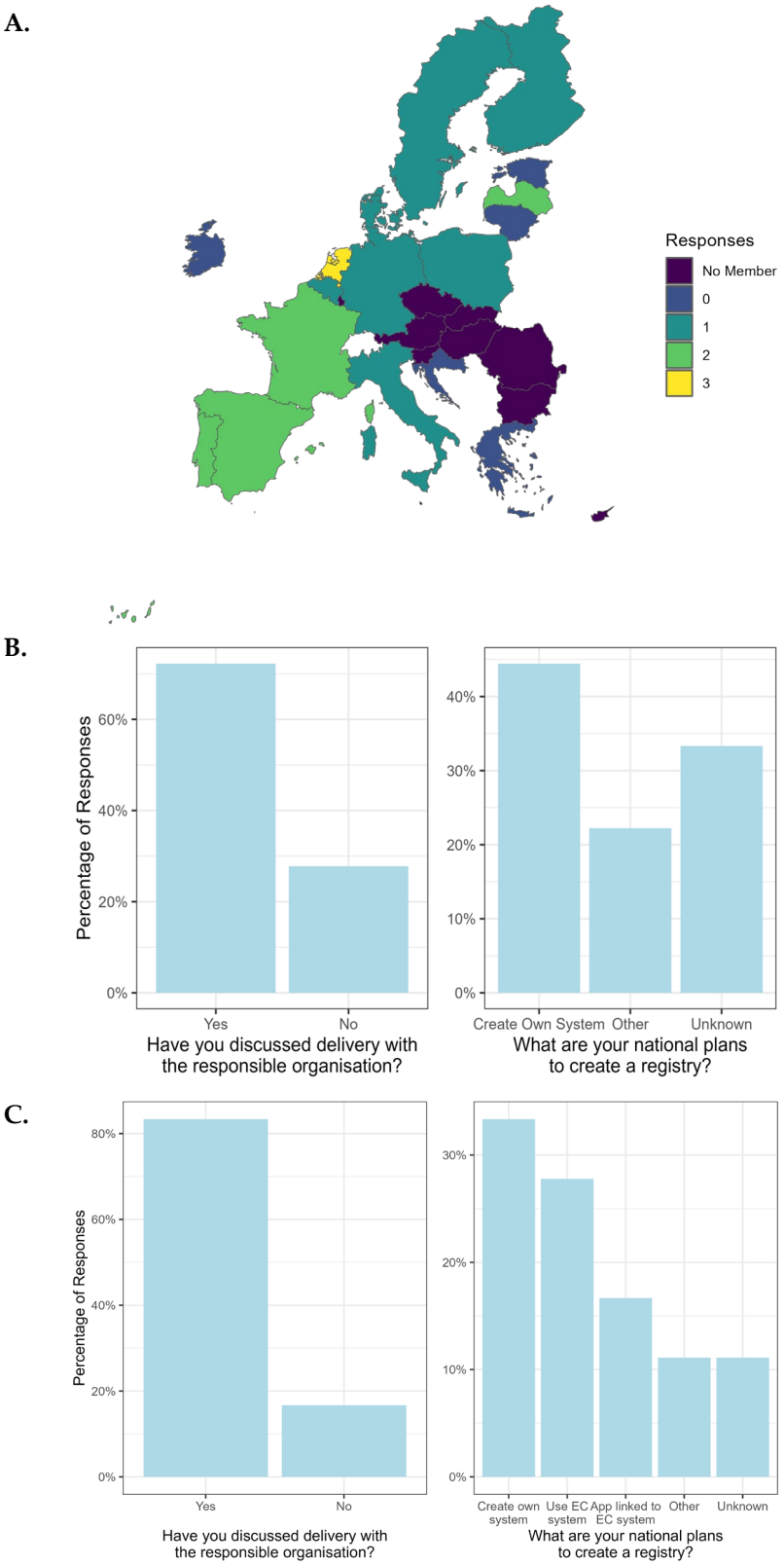

Figure 3: WGRFS responses to a survey about the new control system. A. responses by country; B. national registry; and C. electronic catch reporting.

2.4.2 Survey methods

Leads: Annica de Groote and Stephen Taylor

The ISG on survey methods was structured into three main parts. The first part focused on ways to combine survey data from different sources. The rationale for this topic was provided through discussions/ideas generated from last year's WGRFS. Three oral presentations were provided:

- Design and estimation considerations among complemented designs in the US (John Foster, NOAA, USA).
- Comparing harvest estimates from off-site and on-site recreational fisheries surveys (Hans Jakob Olesen, DTU Aqua, Denmark).
- The use of an online angling diary to estimate shore angling catch rates in Ireland. Early insights (Diarmuid Ryan, Inland Fisheries Ireland).

Common to these presentations was that they all tried to account for discrepancies between estimates from on- and off-site surveys. Potential sources for discrepancies are, for instance, differences in demographics, frame coverage, and non-response patterns between surveys.

The second part of the session focused on outputs over the last 12-months. This included a presentation on a review paper on coverage error in recreational fishing surveys shortly to be submitted to a journal (Stephen Taylor). The review paper is based on case studies from Norway, Sweden, the US, Australia, and New Zealand, and provides recommendations to survey practitioners to assist in assessing and correcting for coverage error which is often an issue in recreational fishing surveys.

Annica de Groote then provided a presentation on the 2025 ICES symposium "Future-proofing surveys: integrating probability and non-probability methods in fisheries" to be held in Sweden in 2025. Planning for the symposium is well underway, with abstract submission and registration opening in December 2024. A flier for the symposium was presented, and participants were encouraged to sign up for news at FutureProofingSurveys@slu.se. The symposium will provide an ideal place to discuss contemporary and emerging survey methods and ways to integrate probabilistic and non-probabilistic methods to deliver cost-effective and robust estimates of catch.

In the final part of the session, future activities and outputs for the survey methods ISG were discussed. It was acknowledged that planning for the 2025 ICES symposium will be the main focus for the group leads over the coming 12-months.

2.4.3 Quality assessment of surveys

Leads: Pedro Veiga, Mafalda Rangel, and Bruce Hartill

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 EU-MAP 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 undertaken to address the subjectivity of some of the existing questions, provide a more logical flow of the questions, and create different assessment criteria for onsite and offsite 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, important changes to the QAT template were addressed and several tools to support the QAT were prepared and/or finalized, namely: a workflow on the QAT and expert advice process (finalized); a QAT library and list of experts (ongoing); a glossary on MRF (updated version of a living document); and a library of existing QATs (ongoing). The changes to the QAT template included three main aspects: an introductory section with a short description of the survey; additional guidance on each question in the template, with examples depending on the type of survey: the inclusion of a more detailed recommendations section. In 2023, the QAT related publication was also discussed, and a concept paper was agreed on.

In 2024, the session addressed two key topics: (1) the upcoming EU Control Regulation smartphone application, mandatory by January 2026, and (2) the first peer-reviewed publication on the QAT. Discussions on the app centred on its potential for data collection and how the QAT could be used to evaluate the app's content, data input, and quality assurance. The QAT ISG agreed to collaborate with other relevant ISGs (e.g. Novel Methods, Survey Assessment Methods) to draft a document outlining key app and survey requirements. The group also planned an online workshop with WGRFS members to finalize these requirements and emphasized the need to adapt the QAT for app development and surveys. In the second part of the session, the group reviewed the initial draft and outline of the first QAT-related publication. It will be a conceptual scientific paper, focusing on the development and implementation of a quality assessment toolkit for evaluating recreational fishing surveys in various contexts, and with different survey designs. After discussing additional ideas for the paper's structure and content, it was agreed to have a more complete draft ready by the end of 2024.

The final discussion focused on the QAT ISG's tasks and goals, specifically addressing two key points: (1) what should be the future focus of the ISG; and (2) whether it is prioritizing the right topics and discussions regarding quality assurance in recreational fisheries surveys.

2.4.3.1 Assessing the quality of national survey programmes

No national surveys were assessed in 2024.

2.4.4 Regional coordination and data storage

Leads: Lucia Zarauz and Estanis Mugerza

One of the most important aspects for improving coordination at the regional level is to be able to incorporate MRF data into the RDBES, as is the case with commercial fishing data. The objective is that by 2027 RDBES will be used both for the ICES assessment working groups and for regional coordination.

The ICES Working Group responsible for the governance of this database (ICES WGRDBES-GOV) identified as a high priority the development needs of incorporating MRF data into the RDBES. These include functionalities to make it possible to upload and download recreational data.

The recreational data consist of three different data types: landings, effort and length distribution data. For each of the three types a complete development and implementation through the RDBES should be made from tables to security. WGRDBES will meet in November 2024 and will provide feedback about the current situation regarding marine recreational fisheries data and its incorporation to the RDBES.

2.4.5 Catch and release and animal welfare

Leads: Simon Weltersbach and Keno Ferter

Globally, Catch-and-Release (C&R) is a widespread practice among recreational anglers (Policansky, 2002; Arlinghaus, 2007). This also applies to many fish species in marine recreational fisheries in Europe (Ferter et al. 2013). The term C&R refers to catching fish with rod and line and releasing them alive where they were caught, assuming they survive unharmed (Policansky, 2002; Arlinghaus et al., 2007). Nevertheless, usually not all individuals survive after being released. Moreover, C&R can result in sublethal effects like physiological stress reactions (Cooke et al., 2013), alterations in behavior (Thorstad et al., 2004; Baktoft et al., 2013), as well as decreased growth or reproductive rates (Diodati and Richards, 1996; Siepker et al., 2006; Pinder et al., 2017). To ensure sustainable fisheries management, including recreational fisheries, it is therefore essential to consider C&R rates and the lethal and non-lethal effects of C&R in stock assessments and the development of fisheries management measures. This is the only way to ensure that fishing mortality from recreational fishing is not underestimated and that effective management measures can be established (Coggins et al., 2007; Kerns et al., 2012). Despite the growing number of studies on the effects of C&R on European marine fish species in recent years (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) there is still a lack of understanding regarding the potential negative impacts on different species and fisheries in Europe.

The TORs of the intersessional group (ISSG) on "Catch and release impacts, including animal welfare" are:

1) Providing a scientific knowledge hub for studies and questions regarding C&R.
2) Identify important issues around general fishing and C&R practices with regard to fish welfare.
3) Promote and support lethal and sublethal impact studies for relevant species.
4) Promote and support the inclusion of post-release mortality in relevant stock assessments.

An important part of the session during the working group meeting was the presentation and discussion of several planned, ongoing, or recently finished research projects on C&R impacts for various species.

First, South Africa presented progress in their project aiming to conduct a global review of lethal and sublethal impacts of C&R and a meta-analysis for estimating mortality in catch-and-release fisheries. The study will build on methods of previous C&R literature assessments to undertake a global systematic review of trends and factors associated with lethal and sublethal impacts of C&R across taxa, gears, techniques, fisheries, and environmental conditions. So far (June 2024), 275 studies (peer-reviewed and grey literature) in a marine context have been identified and added to the database. In addition, a quality assessment of the C&R studies is being developed based on the ICES WGMEDS critical review framework for discard studies in commercial fisheries (ICES, 2015). The second goal of the project is to build a structured decision tree model that incorporates significant factors that influence C&R mortality by species, family, or life-history traits. The outcome of this would be a user-friendly, open-access management tool through which a variety of variables can be selected to evaluate the expected post-release mortality associated with any C&R recreational fishery. The predicted mortality estimates will be bounded and weighted depending on the quality and quantity of the input data.

Second, Portugal gave an update on their containment study on immediate and short-term post-release mortality and sublethal impacts of two white sea bream species (*Diplodus spp.*). The study design comprises experimental angling with different hook sizes and blood sampling (glucose,

lactate, and cortisol) after capture, death, or after 4 and 24 hours after C&R. After some problems with the practical implementation of the study design in previous trials, the study design and materials could be successfully adapted, and the first trials were successfully completed. However, more trials were planned and the work is ongoing.

Third, preliminary results from a study on lethal and sublethal impacts of C&R on Atlantic salmon (*Salmo salar*) in the recreational trolling fishery in Sweden and Germany were presented. Post-release survival of n= 44 salmon caught and released in the Baltic recreational trolling fishery was investigated by using pop-up satellite archival tags (PSATs). Preliminary results indicate high post-release survival rates but more detailed analyses need to be conducted.

Fourth, the final results of a study on post-release survival of flatfish in the German Baltic recreational fishery were presented. The study aimed to estimate post-release survival rates for plaice (*Pleuronectes platessa*), dab (*Limanda limanda*) and flounder (*Platichthys flesus*) under realistic angling conditions. In addition, selectivity, catch rates and hooking positions of different hooks were evaluated. Overall, the study revealed high post-release survival rates (on average > 90%) for the three flatfish species. Deep hooking and high water temperatures (> 15°C) increased post-release mortality. Hook size and hook design influenced deep hooking and thus mortality but had no effect on catch rates and small effects on size selectivity.

Two main topics were discussed during a subsequent discussion session. First, an update of the sea bass angling practices presented by Lewin et al. (2018) was requested for the assessment of the northern sea bass stock. Possible changes in sea bass angling practices in the individual countries were discussed, and data were updated where available. Overall, however, it became apparent that hardly any new information was available. Individual countries wanted to search for additional available information as part of the intersessional work of the group. Second, the need for information on lethal and sublethal effects of C&R on pollack (*Pollachius pollachius*) was discussed. Although there was some preliminary information on this topic available, it became clear that there is a need for more research on this topic in future. A group of interested people decided to concentrate on this topic and to collect and review available information as part of the intersessional work. It was also noted that aspects of animal welfare have not yet been sufficiently addressed and it was decided that the ISSG should focus on this topic in the coming years.

2.4.6 Stock assessment and reconstruction

Leads: Martina Scanu and Zachary Radford

The main aim for the stock assessment and reconstruction group was to review the output from the Productivity Susceptibility Analysis to highlight key stocks for inclusion in stock assessment and data collection. A PSA was performed using an adapted version of the National Oceanic and Atmospheric Administration (NOAA) PSA framework. The modified approach incorporates uncertainty and importance scores to parameterize a beta-distribution, as illustrated in Figure 4, to estimate the potential range of scores.

The group found the identified species with high and low susceptibility generally acceptable (Figure 5). However, certain ecoregions, such as the Mediterranean and Baltic seas, required spatial splitting to fully capture all significant species. Furthermore, additional species were requested for inclusion in specific ecoregions. An additional round of data-collection based on this is currently being analysed and new susceptibility will be produced.

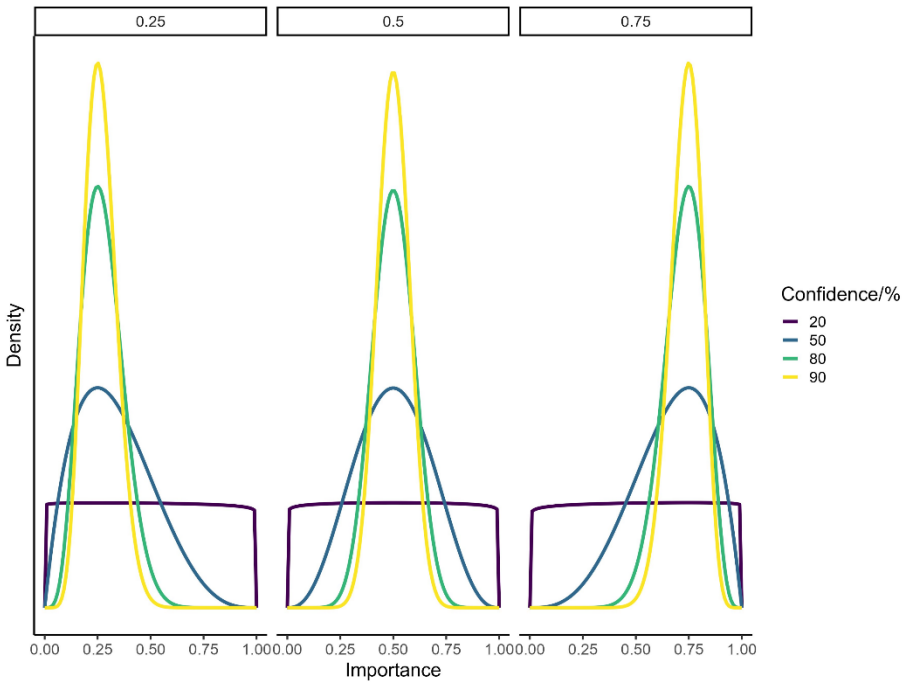

Figure 4: The probability-density-function for the beta distribution for each importance and confidence score. Each panel shows the distribution generated for the three levels of importance assigned.

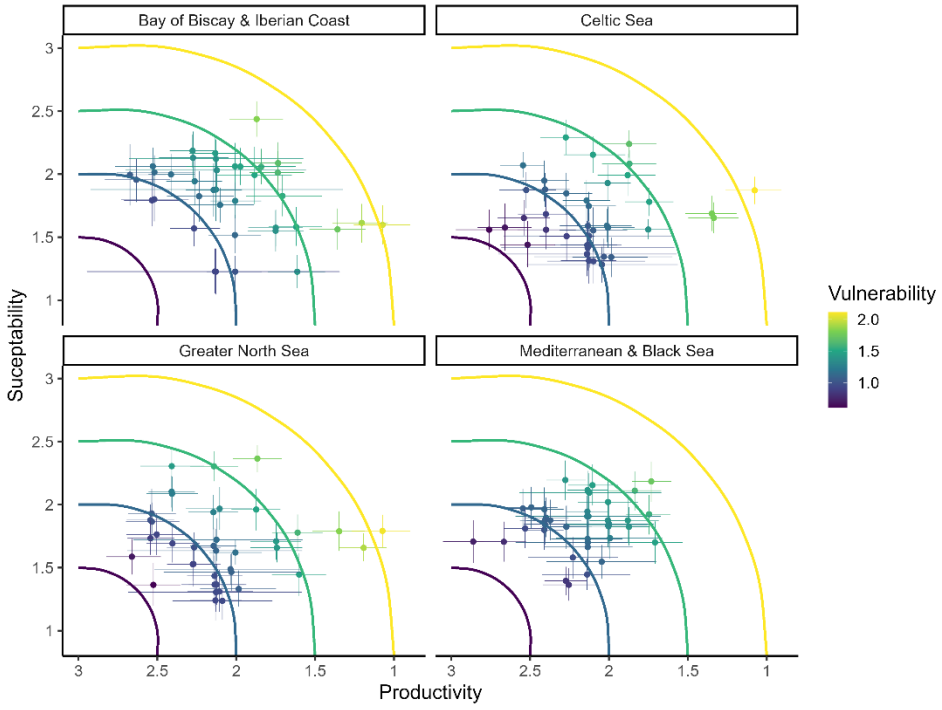

Figure 5: The productivity and susceptibility scores ± 95% CI. Scores represent the worst score given by a country within an ecoregion, and so are a worst-case scenario. Higher susceptibility scores are worse, lower productivity scores are worse. The curved lines depict the boundaries for risk categories where species between the: purple line and bottom left are very low risk, purple and blue lines are low risk, blue and green are moderate risk, and green and yellow lines are high risk. Points closer to the top-right of the plot are considered higher risk.

2.4.7 Novel methods

Leads: Christian Skov, Valerio Sbragaglia, and Paul Venturelli

A summary of the achievements of the Novel Methods ISG over the previous year was presented by the chairs and included:

- Initiation of a "best practices" document that can support managers who wish to include data collection via angler apps in their data collection programmes.
- Completion of a report on the "current potential and limitations for social media and search volumes on the Internet". The report is included at the end of this meeting summary (Box 2).
- Engagement with the consortium "Machine learning for fish species and size identification".
- Updates to the online repository of projects and publications involving novel methods by ISG participants and their colleagues. There are now almost 60 papers listed, and the number of projects has ballooned to almost 50 from ~30 countries and regions. The increase in projects 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 (18 of the 35 projects that completed this field).

The next year will be the last one of the period 2023–2025; therefore, the ISG should consolidate one of the general ToRs of WGRFS, which is specifically related to assess novel approaches for surveys (e.g. combining probabilistic and non-probabilistic sampling) and analysis methods (e.g. treatment of outliers, machine learning). This will be done by actively participating to the ICES Symposium planned for October 2025 (contact person Anika de Groote) that will focus on non-probabilistic vs. probabilistic sampling methods and how they compare.

2.4.7.1 Presentations and related discussions

Five presentations were made. Christian Skov (DTU Aqua, Denmark) provided a summary of different digital methods that are used to collect information about angler behaviour. Specifically, he highlighted the content from a book chapter (in press) and other empirical examples from published studies.

Valerio Sbragaglia (Department of Marine Renewable Resources, Institute of Marine Sciences, ICM-CSIC) provided a brief overview of published research using social media and aggregated Internet activity (e.g. Wikipedia page views and Google search volume) for understanding recreational fisheries and, more generally, societal response to aquatic and fisheries dynamics. He also highlighted the need to look at social media from a holistic perspective, which implies monitoring recreational fishing as well as communication and engagement. The latter aspects were also discussed within the context of the ISG on communication and engagement.

Sean Tracey (University of Tasmania) presented "Evaluation of an app-based recreational fishing survey against population benchmarks from a traditional probability-based survey". The study found that fisheries professionals are wary of app data (54% were confident in app-based results compared to 95% confidence in probability-based surveys), and that app data can be used to estimate recreational catch and/or effort. However, there is still a need for a reliable census or robust framework to calibrate data collected, and methods need to be refined to minimize attrition in participation and maintain reporting rates

Christian Skov (DTU Aqua, Denmark) gave the presentation "Citizen science and angler apps to collect data from recreational fisheries" where he summarized some of the learning obtained

from running a citizen science platform to collect data from recreational fisheries since 2026. The peer-reviewed publications derived from the citizen science project suggests that the method is challenged by low user retention, but still seems able to collect fisheries metrics data comparable to traditional methods. At least for fisheries where data flow is relatively high.

Josh Hrabowski (Ball State University, USA) presented preliminary results of comparisons between common fisheries metrics from creel surveys and FishBrain data. He showed that it may be possible to convert app data to creel data for some but not all metrics (provided that sample sizes are large enough), and highlighted the importance of looking at outliers during the comparisons, and what they could have in common. The talks fostered discussion about outliers, and it seems that they could be related to aspects of the methodology of the creel survey. Moreover, there was a general great interest among the participants to further our knowledge of how to secure best possible data collection through electronic platforms, which is particularly relevant to MSs because of the recent update to the Control Regulation.

In summary, the talks showed that the ISG houses and fosters a well-developed research substratum on the use of fishing apps in research and monitoring recreational fishing, and is at the forefront of the emerging use of social media and other digital data sources for understanding ecological and social aspects in recreational fishing.

2.4.7.2 The new EU control regulation and the future role of the ISG

A new control regulation (EU) 2023/2842 was initiated in Europe on 1 January 2024, which complements the existing EU-MAP regulations, but also brings fundamental changes to recreational fisheries data collection. This states that, from 10 January 2026, an electronic catch registration system should be in place (either from the EU or from the MS) so that sea anglers can report their catches of certain species on a daily basis. By 10 May 2024, MSs had to report if they would develop their own system or join a shared EU catch reporting platform that the EU will develop. This implies that many new angler app reporting initiatives across Europe will start, which was of great interest to the ISG. However, there was also general concern regarding the short time frame for developing the EU app and related monitoring program, and the limited interactions with the WGRFS – especially in the technical and theoretical aspects of app development in the context of recreational fishing. During the meeting, the ISG had the chance to mention this to Joana Patricio from DG Mare, who is leading the development of the EU app, and encouraged her to involve the ISG as much as possible in the coming process. This was supported by relevant stakeholders such as European Anglers Alliance.

2.4.7.3 Milestones for the coming year

Based on the talks, discussion, and feedback during the 2024 meeting, the following milestones were set for the period 2024/2025, together with the people that will lead and coordinate the activities to accomplish them:

- Continue to develop a best practice document that can support managers who wish to include data collection via angler apps in their data collection programme.
- Maintain the online spreadsheet for members about relevant papers and ongoing and planned activities related to novel methods. The idea is that the spreadsheet will support information sharing and foster collaborations.
- Continue to engage in the consortium “Machine learning for fish species and size identification”.
- Participate in the planning of the ICES symposium on non-probability methods that will be held in Sweden October 2025.

Box 2: Social media and search volumes in recreational fishing research and monitoring.

Recognized Potential

Social media platforms may provide extensive data on capture trends, species targeted, and fishing methods with the potential to provide large spatial-temporal scale insights at relatively low costs. For example, geolocated Internet activities may track the time fishers spend at specific sites, combining catch data with effort levels. Moreover, analysing social media content may reveal the social dimensions of recreational fishing, including attitudes towards catches, conservation practices, and illegal activities. In this context, search volumes on the Internet may be used as a proxy of public attention to recreational fishing aspects, or the emergence of new recreational fishing trends (e.g. new technique or gears). Finally, recreational fishers sharing catches on social media are often more avid and spend more time and money on fishing (i.e. possibly occupying a key position in the community), making them instrumental in engaging the fishing community.

Research Needs

Data from social media often bias towards more avid and specialized individuals, making it difficult to generalize findings to the broader recreational fishing population, leading to overestimations of certain behaviours or catch rates. In particular, the exact proportion of recreational fishers sharing their catches online is not well documented - or different among area, target species, and fishing techniques - complicating data extrapolation to the entire fishers' population. Moreover, search volumes may represent trends of public attention associated to other cultural aspects not strictly related to recreational fisheries. Therefore, ensuring the accuracy and representativeness of data from digital platforms and search volume requires rigorous verification processes and documentation of search strategies to validate findings. The quality and detail of data may be inconsistent, with some platforms offering more useful information than others and a complementary integration of different data sources is always suggested. Finally, the use of, for example, geolocation and personal data from social media raises significant privacy concerns. Addressing these is essential to avoid negative perceptions and ensure ethical research practices.

In summary, social media and Internet search volumes hold significant potential for enhancing recreational fishing research and monitoring. However, challenges related to bias, quality, and privacy must be carefully managed to leverage these tools effectively. In particular, automated near-real time tools to increase accessibility and usability of these data are expected to boost their integration into research and management.

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2.4.8 Human dimensions

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

The human dimension of recreational fisheries is a multidimensional topic that encompasses different research areas. In fisheries, it is commonly accepted that the management of fisheries largely involves the management of people and that the human dimension of management needs to be recognized. This year the human dimension intersessional group focused on: (1) exploring, if the condensed set of questions (specialization framework) can predict angler heterogeneity; (2) identifying a framework to study behavioural change; (3) measuring angler compliance with fishing regulations; and (4) identifying and developing social and economic indicators particularly to aid resource allocation decisions.

Following extended testing of the condensed set of questions to capture angler heterogeneity in Denmark and Germany, the framework found wider application in UK and South Africa. It was agreed to work together to test the construct validity and the performance across different countries and cultures.

The interplay between fish populations, anglers, and management measures has a direct impact on the sustainability of recreational fisheries. Different angler behaviours can have a significant impact on the sustainability of fisheries (e.g. choice of target species, compliance with

regulations, voluntary catch and release, catch and release behaviour). This year we investigated anglers' environmental attitudes and their views on climate warming. Using data from a national survey in Germany we explored if environmental attitudes explained their view on climate warming. The New Environmental Paradigm (NEP) scale was used to measure endorsement of pro-ecological worldviews in five facets (Dunlap et al., 2000). Here, higher NEP values indicate a commitment to preserving the natural environment, while lower NEP values reflect a more anthropocentric orientation (Hawcroft and Milfont, 2010). Anglers' perceived changes in aquatic ecosystems due to climate warming were measured by asking anglers to rate 29 statements regarding these impacts. The analysis revealed that the NEP scale ratings had little predictive power to predict anglers' assessment of climate warming effects. Future studies should be careful to survey anglers with open-ended questions about the identified impacts of climate warming on aquatic ecosystems, as anglers may not yet feel expert enough to evaluate preconceived statements. Also, other measures of environmental perception such as the Environmental Attitudes Inventory (Milfont and Duckitt, 2010) and others may provide better explanatory power.

In order to test if interventions change angler's behaviour it is important to collect baseline data, e.g. on compliance. Similarly, to test if newly introduced regulatory measures, such as the mandatory electronic catch reporting introduced with the new EU Control Regulation (2023/2842), will lead to declining compliance, through the rejection of top–down regulations, baseline data before the regulation comes into force needs to be collected. Simple studies on anglers' knowledge of existing fishing regulations (multiple choice format) are sufficient to establish a proxy of compliance to test against later.

Studying economic leakage offers an interesting concept to evaluate how and if angler expenditures benefit local communities. Localized studies are critical to better understand the economic activity generated by recreational fisheries and can help to map a path for promoting recreational fisheries as a tool for social and economic development.

2.4.9 Communication and engagement

Leads: Sean Tracey and Pablo Pita

The Communication and Engagement ISG aims to enhance communication and engagement between research and stakeholders, including government, anglers, commercial fishers, and the broader community. Emphasis is on building social license and understanding among the community, especially regarding animal welfare and the values of fishing. Strategies are being reviewed and improved, with a focus on measuring effectiveness. Outputs from the ISG include an infographic summarizing recreational fishing in Europe and a policy brief. Collaboration with communication experts has facilitated the creation of accessible materials. The goal is to produce content understandable even to those unfamiliar with fishing, promoting understanding of its implications and nuances.

Samantha Hook and Grace Farrell from Substance, UK, introduced the Catchwise Program and Sea Angling Diary projects that aim to collect data from UK anglers, with the former focusing on real-time surveys and the latter being a longstanding diary project. Catchwise involves on-site surveys and volunteer participation, aiming to understand angling activity. The projects utilize various communication methods, including online meetings, in-person events, phone calls, infographics, social media, and advertisements. Canva, an online platform, aids in creating infographics. Social media advertising has proven effective in reaching new audiences, with a survey showing significant awareness gaps among respondents. Additionally, an app provides open access to collected data, benefiting both policymakers and anglers.

Sean Tracey briefly discussed Social Media metrics from the Tuna Champions Program in Australia. Over 18 months, the Tuna Champions initiative saw significant social media growth,

reaching 6.9 million accounts. This metric serves as a tangible measure of program success. Notably, occasional viral posts drove substantial engagement, often focusing on practical fishing tips rather than scenic imagery. This underscores anglers' genuine interest in improving their practices. These spikes correlated with significant increases in followers. Social media's importance is magnified with younger anglers, for whom it's routine. Analysing the data reveals international reach, with increasing interest from the UK presumably resulting from the emerging recreational fishery for tuna. Effective communication extends beyond borders, impacting diverse angling communities and highlighting the initiative's global relevance.

Filipe Freitas Henriques presented on an app developed in Madeira for communicating with anglers. With the aim of building trust and increasing engagement by anglers with a user-friendly application, starting with angler championships and spearfishing contests. Ecological education and clarifying regulations were prioritized based on stakeholder feedback. One example of this stakeholder feedback was the development features like weather updates, legislation and management updates, and license renewal. Annual meetings clarified legislation, fostering understanding among non-native fishers. The app, launched recently, has 120 users. The take home message was that engaging stakeholders fosters responsibility and active participation in tool development.

The group then had an open discussion which converged on the topic of apps for a range of purposes including data collection and engagement. The conversation revolved around researchers collaborating with app developers to enhance data collection and engagement in recreational fisheries. Alex Winkler discussed a failed collaboration in South Africa and the concept of piggybacking on established apps. The importance of communication between researchers and developers was highlighted, emphasizing the need to understand user needs. Strategies like providing services to anglers, developing live session tracking, and simplifying app design were discussed. Challenges include engaging non-competitive and less avid anglers and balancing app features. Ultimately, the goal is to incentivize data submission while keeping apps user-friendly and relevant to anglers' needs, additions such as weather reports and species identification that are useful to anglers may increase uptake.

There was also discussion highlighting concerns about data ownership and its potential use against anglers. Collaborations with app companies raise questions about data transparency, ownership, and governance. Challenges include aligning research needs with app data and addressing the commercial nature of app businesses. Strategies involve fostering partnerships, promoting app use among anglers, and exploring AI for data analysis and individual feedback reports. The aim is to navigate concerns and improve data collection while ensuring transparency and stakeholder engagement.

The group then discussed plans to draft a policy brief paper, aiming to provide practical guidance based on a summary analysis of case studies for improving engagement across different sectors. It will consider diverse communication channels and suggest tailoring strategies to different angling groups. Additionally, it will discuss measuring the success of communication initiatives and propose categorizing case studies based on their goals and outcomes. The paper structure will include sections on policy options, recommendations, and conclusions. It will also consider how some approaches may be more effective in some countries than others.

Finally, it was discussed that the ISG would like to pursue a workshop that brings together angler representative groups, researchers and potentially relevant policy-makers to discuss how we more effectively communicate across these stakeholder groups. It was considered that the use of apps could be a focus topic of the workshop. It would be a conjointly run workshop with a plenary from each stakeholder group. It was suggested that the workshop could run after the European Angling Association meeting in Brussels.

2.5 Food safety and human health issues

Recreational fishers potentially fish close to the coast and some fishers are prone to fish close to contamination sources in their vicinity, and additionally some fishers have high catch and consumption rates (Vølstad et al., 2011). This might lead to high exposure to environmental pollutants including heavy metals, dioxins and PCBs, per- and polyfluoroalkyl substances etc. As this may lead to health effects in rec fishers as well as to altered harvest and fishing behavior of rec fishers, it was considered timely to introduce and discuss the topic in a plenary session of the expert working group.

For Norway, having one of the highest participation rates in recreational fishing (Arlinghaus et al., 2015; Hyder et al., 2018), it is especially relevant to have advisories for the public on the intake of self-caught seafood. To get an overview of the existing advisories in the different countries, an online-survey was introduced in a short plenary presentation and sent to all participants of the WGRFS meeting considered being experts on recreational fishing in their respective countries. In the survey the experts were asked about the presence and extent of existing advisories on the intake of self-caught seafood. In total, 16 persons from 8 different countries including Argentina, Finland, France, Germany, Italy, Netherlands, Portugal and Spain answered the survey. Half of the respondents replied that there are no advisories relevant to MRF available. The actual given advisories were mostly available online. All advisories are given in the local language of the respective country and mostly they are not available in English which makes them difficult to read for foreigners or residents not speaking the local language. Asked how difficult it is do find the consumption advices, the answers varied widely from “easy” to “extremely difficult”, but with a clear tendency towards more difficult. The survey results delivered important information and more detailed results and the actual existing advisories will be considered when developing advisories for rec fishers in Norway.

In a second and extended plenary session, relevant concepts to evaluate food safety in rec fishing were introduced. Also, important drivers of contaminant variation including habitat, trophic position, location (small-scale and large-scale), body size, organ and fillet distribution and processing were presented and its importance for rec fishing discussed using relevant examples. In contrast to legal maximum levels which are set for the trade of seafood, health-based guidance values including tolerable weekly intakes have been identified as more relevant in the context of recreational fishing. To be able to assess the risk from intake of self-caught seafood, both occurrence data of contaminants, and consumption data are needed. In Norway, occurrence data of many important contaminants is available for most important fish species and the commercially most important areas. The relevance of these data for rec fishers, needs to be assessed as the fishing areas for rec and commercial fishers do not always overlap. Further, consumption data for rec fishers is scarce and existing data suggests relatively high consumption rates. Possibilities for collaboration and use of existing catch data as proxy for consumption data were discussed at the session. As a starting point, existing catch diary data assuming that the whole catch is consumed could be combined with existing occurrence data to do some worst-case calculations and assess if persons with high catch rates are in danger of exceeding the tolerable weekly intakes for certain contaminants. It was also discussed how relevant consumption data could be retrieved from existing surveys and how the topic might be included in future surveys.

Although the topic was received with some scepticism by the working group, there was an agreement that it is highly relevant also for the working group and should be discussed and integrated further.

2.6 Publications

Highlighting the WGRFS achievements and planning future contributions is essential to raising its profile. Recently, our efforts have focused on peer-reviewed papers due to their longer lead times, while other communication channels are reviewed by the Communications and Engagement intersessional group. Proposed papers include topics like governance, quality assessment, impacts and allocation, innovative methods and big data, non-probabilistic approaches, and angler heterogeneity. In addition, WGRFS proposed a Workshop on Recreational Fisheries in Stock Assessment (WKRFSA) that has developed approaches for embedding MRF data in the assessment and advisory process (ICES, 2024). Finally, an infographic on MRF in Europe has been generated and a symposium on integrating probability and non-probability methods in fisheries is planned for 2025.

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 Faro (Portugal) from 2–6 June 2025. It will be hosted by Mafalda Rangel at the University of the Algarve.

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Annex 1: List of participants

Name	Institute	Country (of institute)	E-mail
Adam Lejk	National Marine Fisheries Research Institute	Poland	adam.lejk@mir.gdynia.pl
Alexander Winkler	Rhodes University	South Africa	alexwinkrsa@gmail.com
Amélie Régimbart	Ifremer	France	amelie.regimbart@ifremer.fr
Anastasios Papadopoulos	Fisheries Research Institute	Greece	apapadop@inale.gr
Anders Kagervall	Swedish University of Agricultural Sciences	Sweden	anders.kagervall@slu.se
Anna-Marie Winter	Wageningen University and Research	Netherlands	anna-marie.winter@wur.nl
Annica de Groote	Swedish University of Agricultural Sciences	Sweden	annica.isaksson.de.groote@slu.se
Antanas Kontautas	Klaipeda University	Lithuania	Antanas.Kontautas@ku.lt
Branko Dragicevic	Institute of Oceanography and Fisheries	Croatia	brankod@izor.hr
Christian Skov	DTU Aqua–National Institute of Aquatic Resources	Denmark	ck@aqua.dtu.dk
Chun Chen	Wageningen University and Research	Netherlands	chun.chen@wur.nl
Chris Bova	Rhodes University	South Africa	csbova@gmail.com
Dace Zilniece	BIOR	Latvia	dace.zilniece@bior.lv
David Vertegaal	Sportvisserij Nederland	Netherlands	vertegaal@sportvisserijnederland.nl
Diarmuid Ryan	Inland Fisheries Ireland	Ireland	diarmuid.ryan@fisheriesireland.ie
Didzis Ustups	Institute of Food Safety, Animal Health, and Environment (BIOR)	Latvia	didzis.ustups@bior.lv
Eneko Bachiller	AZTI	Spain	ebachiller@azti.es
Estanis Mugerza (chair)	AZTI	Spain	emugerza@azti.es
Evanthia Karasavva	Fisheries Research Institute	Greece	ekarasavva@inale.gr
Filipa Duarte	Regional Government of Madeira	Portugal	filipa.p.duarte@madeira.gov.pt
Filipe Freitas Henriques	Regional Government of Madeira	Portugal	filipe.f.henriques@madeira.gov.pt

Name	Institute	Country (of institute)	E-mail
Freya Ivy Palmer	University of Southampton	UK	F.I.Palmer@soton.ac.uk
Grace Farrell	Substance	UK	Grace.farrell@substance.net
Hannah Rudd	The Angling Trust	UK	hannah.rudd@anglingtrust.net
Hans Jacob Olesen	DTU Aqua–National Institute of Aquatic Resources	Denmark	hjo@aqua.dtu.dk
Harry Vincent Strehlow	Thünen Institute of Baltic Sea Fisheries	Germany	harry.strehlow@thuenen.de
Henrik Pärn	SLU Department of Aquatic Resources Institute of Marine Research	Sweden	henrik.parn@slu.se
Hugo Diogo	Secretaria Regional do Mar e Pescas, Direção Regional das Pescas	Portugal	hugo.mc.diogo@azores.gov.pt
Joana Patricio	European Commission	EC	joana.patricio@jrc.ec.europa.eu
João Pontes	Centre of Marine Sciences	Portugal	a50642@ualg.pt
John Foster	NOAA	US	john.foster@noaa.gov
Jules Selles	Muséum national d'Histoire naturelle	France	jules.selles@gmail.com
Karina Ryan	Department of Primary Industries and Regional Development, Western Australian	Australia	karina.ryan@dpird.wa.gov.au
Keno Ferter	Institute of Marine Research	Norway	keno@hi.no
Kieran Hyder (chair)	Cefas	UK	kieran.hyder@cefas.gov.uk
Krzysztof Radtke	National Marine Fisheries Research Institute	Poland	radtke@mir.gdynia.pl
Lara Salvany	ICES	Denmark	lara.salvany@ices.dk
Leonardo Venerus	Centro para el Estudio de Sistemas Marinos (CESIMAR-CONICET)	Argentina	leo@cenpat-conicet.gob.ar
Leonie O'Dowd	European Commission	EC	Leonie.O'DOWD@ec.europa.eu
Luca Bolognini	National Research Council (CNR) Institute for Biological Resources and Marine Biotechnologies (IRBIM)	Italy	luca.bolognini@cnr.it
Mafalda Rangel	Centre of Marine Sciences	Portugal	mrangel@ualg.pt
Marc Simon Weltersbach	Thünen Institute of Baltic Sea Fisheries	Germany	simon.weltersbach@thuenen.de

Name	Institute	Country (of institute)	E-mail
Marta Pujol-Baucells	ICATMAR	Spain	martap@gencat.cat
Martín García Asorey	Grupo de Investigación y Desarrollo Tecnológico en Acuicultura y Pesca (GIDTAP-UTN)	Argentina	mgarciaasorey@frch.utn.edu.ar
Martín Laporta	National Directorate of Aquatic Resources	Uruguay	negrolapo@gmail.com
Martin Mortensen	European Commission	EC	Martin.MORTENSEN@ec.europa.eu
Martin Wiech	Institute of Marine Research	Norway	Martin.Wiech@hi.no
Martina Scanu	National Research Council (CNR) Institute for Biological Resources and Marine Biotechnologies (IRBIM)	Italy	martina.scanu@irbim.cnr.it
Matthew Farthing	Rhodes University	South Africa	matthew.farthing.rsa@gmail.com
Miikka Husa	Natural Resources Institute Finland	Finland	miikka.husa@luke.fi
Mišo Pavičić	Institute of Oceanography and Fisheries	Croatia	pavicic@izor.hr
Paz Jiménez	Spanish Institute of Oceanography (IEO, CSIC)	Spain	paz.jimenez@ieo.csic.es
Pablo Pita	University of Santiago de Compostela	Spain	pablo.pita@usc.es
Paul Venturelli	Ball State University	USA	paventurelli@bsu.edu
Pedro Veiga	Centre of Marine Sciences	Portugal	pveiga@ualg.pt
Pentti Moilanen	Natural Resources Institute Finland	Finland	pentti.moilanen@luke.fi
Qilei Zhao	Xiamen University	China	qlzhao@xmu.edu.cn
Sabrina Colella	National Research Council (CNR) Institute for Biological Resources and Marine Biotechnologies (IRBIM)	Italy	sabrina.colella@cnr.it
Samantha Hook	Substance	UK	samantha.hook@substance.net
Samira Nuñez	Centre of Marine Sciences	Portugal	samira.velazquez@gmail.com
Sean Tracey	Institute for Marine and Antarctic Studies	Australia	sean.tracey@utas.edu.au
Stephen Taylor	Department of Primary Industries and Regional Development, Western Australian	Australia	steve.taylor@dpird.wa.gov.au
Thomas Lanssens	ILVO	Belgium	thomas.lanssens@ilvo.vlaanderen.be

Name	Institute	Country (of institute)	E-mail
Thomas Verleye	Flanders Marine Institute	Belgium	thomas.verleye@vliz.be
Valerio Sbragaglia	CSIC	Spain	valeriosbra@gmail.com
Warren Potts	Rhodes University	South Africa	w.potts@ru.ac.za
Wendy Edwards	Cefas	UK	wendy.edwards@cefas.gov.uk
Zachary Radford	Cefas	UK	zachary.radford@cefas.gov.uk

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	Comments (change in Chair, etc.)
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	Estanis Mugerza completes 3 years as chair
Year 2025	02–06 June 2025	Faro, Portugal	Final report by 01 November 2025 to FRSG	Kieran Hyder completes 3 years as chair

ToR descriptors

ToR	Description	Background	Science Plan codes	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	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 prioritises 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

ToR	Description	Background	Science Plan codes	Duration	Expected Deliverables
		agreed upon 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 management of recreational fisheries.	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.
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	5.4, 7.1, 7.4	Activity- dependent on workshop	Report WG perspectives and publication of scientific

ToR	Description	Background	Science Plan codes	Duration	Expected Deliverables
		workshops on specific topic have been done or are in the workplan. This reviews outcomes of the workshops and the implications for recreational fisheries.			papers.

Summary of the work plan

Year 1	a)	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 approach for the next year. (a, b, c, d, e)
	b)	Evaluate the quality of up to three national survey programmes using the WGRFS Quality Assurance Toolkit (QAT) and provide feedback on tasks requested by ICES. (a, c)
	c)	Review the outputs from ICES WRGRFS led workshops and discuss next steps for the inclusion of outcomes. (f)
	d)	Scope data call for ICES based on the formats developed by WGRFS and the RDBES core group. (c, d, f)
	e)	Assess priorities for inclusion of recreational fisheries in stock assessment using data from the pilot studies. (a, c, d)
	f)	Develop ICES workshop proposal with WGCATCH for integrating probabilistic and non-probabilistic surveys. (b)
	g)	Create 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)
	h)	Assess the potential for food safety and human health issues from consumption of recreational caught fish (e.g. environmental toxins). (e)
	i)	Review and share methods for engaging with stakeholders and the potential for participatory approaches. (e)
	j)	Review progress and achievements on the actions outlined the Marine Recreational Fisheries Roadmap.
Year 2	a)	Evaluate the outcomes from the intersessional work and agree approach for the next year. (a, b, c, d, e, f)
	b)	Review national programmes including assessment of quality of up to three programmes and provide feedback on tasks requested by ICES. (a)
	c)	Assess the potential of novel survey methods to deliver recreational fisheries data (e.g. citizen science approaches, smartphone apps, traditional knowledge). (b)
	d)	Develop a framework for allocation of catches between sectors based on a review of existing systems and provide best-practice guidance. (c,d)
	e)	Develop MSE approaches to assess the impact of uncertainty in recreational catches on assessment and regional sampling programme. (d).
	f)	Review and share methods for engaging with stakeholders and the potential for participatory approaches. (e)
	g)	Assess outcomes of workshop on inclusion of recreational data in stock assessments and other actions in the MRF roadmap (f)

Year 3	a) 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 approach for the next year. (a, b, c, d, e) b) Evaluate the quality of up to three national survey programmes using the QAT and provide feedback on tasks requested by ICES. (a, c) c) Review the outputs from ICES WRGRFS led workshops and discuss next steps for the inclusion of outcomes. (f) d) Collate advances in survey methods that could be used to improved national approaches. (b) e) Assess the potential for impact of climate change on species caught by recreational fisheries and how that could impact on DCF and regional species requirements. (c, d) f) Develop ICES workshop proposal on MSE approaches to assess the impact of uncertainty in recreational catches on assessment and regional sampling programmes. (d). g) Assess the potential of novel survey methods to deliver recreational fisheries data (e.g. citizen science approaches, smartphone apps, traditional knowledge). (b) h) Evaluate progress against three year plan and the MRF roadmap and develop new ToRs. (a, b, c, d, e, f)

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 benchmark workshops for stocks that have recreational catches.
Linkages to other committees or groups	WGCATCH, DIG, WGTFID
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

ICES WGRFS – QAT template (2023 version)

The QAT has been in existence since 2013 and has been reviewed since 2018. WGRFS felt that there was the need to update some of the questions and to reflect onsite and offsite surveys. The revised QAT presented below is a working draft and the first step in this process. Further work will be needed in the coming years to improve the QAT further and consider how to ember this within the TAF. The text in blue relates either to examples of text or what needs to be considered to answer the question.

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*	
Objective(s)	*Obtain catch and effort estimates for marine spearfishing at the national scale*
Target population	*All resident marine recreational fishers of a given country or region*
Sampling approach	*A complemented sampling approach was used, combining a phone survey to obtain participation rates and effort estimates, and an onsite (roving creel) to obtain CPUE data…*
Scale	*Regional / national / local*
Fishing modes	*All recreational fishing modes, marine spearfishing, boat angling, hand harvesting, …*
Stage	*Completed, ongoing (if ongoing, at which stage)*
Country presentation (yes / no)	

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 / No	*A component could be a specific fishing mode or another segment for the fisher population (e.g. non-resident fishers)* *Example: On a national scale survey, non-resident fishers are usually not well identified, as these are not part of the national phone lists etc.*	*Private access points not considered.*
	Is there a component of the target fishery that is not covered by the survey and if so, what was it?	Yes / No	*For example, in a telephone survey, fishers without a listed phone number (either because they do not have a phone or are not in the national phone list (e.g. tourists)*	*For example, for roving creel or access point surveys it is common to exclude night fishing for safety reasons. When this is the case, it should be noted here, along with an explanation on why.*

	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 / No	*For example, in a telephone survey, fishers without an identified/ associated phone number (either because they do not have a phone or are not in the national phone list (e.g. tourists)*	*Private access points not surveyable.*
	Study population		*Describe what parts of the target population were covered*	
Sampling frame	What is the sample frame(s) and the associated PSU?		*Examples:* *on mail survey it would be the list of addresses; PSU = address* *on phone survey, it could be the number of licensed fishers that provided a valid phone number; PSU = phone number*	*Sample frame = days of the year; PSU = day*
	Does the sampling frame adequately cover the target population?	Yes / No	*Example for No – Fishers from overseas*	*No - only part of the day surveyed.*
	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	*Yes – visitors from overseas*	*Yes – night fishing*
Stratification	Are the strata well defined, known in advance (spatial/temporal)?	Yes / No	*No – poor or inadequate record keeping for license database.*	*Fishing season / area not well understood.*
	Is there adequate sampling within each stratum (e.g. days surveyed during weekend/summer)?	Yes / No		*No – proportion of days allocated to weekend strata too low*
Selection	Is sampling probability based (e.g. stratified random, PPS -Proportional to Population Size)?	Yes / No	*If No, provide short explanation on approach.*	*If No, provide short explanation on approach.*

	Has the survey been designed to achieve target precision in an analytically optimal fashion?	Yes / No	*No – no prior data to inform sample size determination.*	*No – no prior data to inform sample size determination.*
	Have issues associated with ethics/ permits and privacy been addressed?	Yes / No	*If No, provide short explanation on approach.*	*If No, provide short explanation on approach.*
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?	Yes / No / Unknown	*Unknown – survey is still running* *If No, provide short explanation on approach.*	*Unknown – survey is still running* *No – New temporal strata introduced pathway through survey* *If No, provide short explanation on approach.*
	Have sampling protocols been documented and followed at each stage (selection of individuals, times, boats, biological samples)?	Yes / No		
	Have contingency protocols been specified to deal with issues such as incomplete interviews of un-surveyable weather and were they required?	Yes / No		*Yes – to deal with need to subsamples large catches for measuring.*
	Has there been any major departure from the survey design (frequent refusal to take observers on board a charter vessel)?	Yes / No		*Yes - frequent refusal to take observers on board a charter vessel.*

	Is there a language barrier (tourist fishery)?	Yes / No / Unknown		
	Have the planned number of sampling events and/or interviews taken place and have the completion rates been documented?	Yes / No	*No – low uptake by spearfishers.*	*No – too many days cancelled because of poor weather*
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 – blocked contact (xx%), etc.*	*Creel survey – refusal (xx%), etc.*
Recall	What is the recall period and is it appropriate to the questions asked?	Yes / No / Unknown	*Please note and explain any relevant information on if the recall period is different depending on the indicator. For example, for effort (number of fishing trips) it can be one month, three months or 12 months. For catch it could only refer to the last fishing trip (which could also be variable depending on the fisher avidity).* *Example of excessive recall period: Three months for catch data*	*Not an issue as fishers interviewed when they returned at end of day.* *Could be an issue if you call them later on because they were still fishing when interviewed on the water.*
Effort	How is effort defined (unit, fishing mode, target species, location) and related to CPUE measures?			
	Was the measure of effort clearly communicated to the fisher (i.e. time	Yes / No / Unknown		*No – if not asked to distinguish between time on the water vs. time actually spent fishing*

	spent with gear in the water)?			
	Is it possible to record incorrect fishing areas?	Yes / No	*Yes – map not provided to phone respondents*	
Catch	Is the retained catch verified by surveyors (e.g. all filleted, don't show)?	Yes / No		*No – if too many cases where fishers refuse to show their catch*
	Is species identification and naming reliable?	Yes / No / Unknown		*No – if too many cases where fishers refuse to show their catch*
	Is there a clear division between fish kept and fish released?	Yes / No	*No – if no question made about the fate of the fish caught*	*No – if no question made about the fate of the fish caught*
	Is it possible that an individual will have also reported the catch of those fishing with them?	Yes / No / Unknown	*Yes – evidence of multiples of the individual bag limit reported by the individual fisher.*	
	Is there a digit preference in the reports (catch numbers and/or length frequencies)?	Yes / No	*Yes - Catches reported at multiples of 5.*	*Yes – length frequency peaks at every 5 cm.*
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?	Yes / No	*If no, clearly explain why.*	*If no, clearly explain why.*
	Has imputation been used to account for missing observations and, if so, is the procedure documented?	Yes / No		
	Has there been weighting to correct for	Yes / No		

	nonre-sponses/avidity bias			
	Has the preci-sion of estimates been calculated and, if yes, how have they been calculated and where are they documented?	Yes / No	*Yes – data bootstrapped at all levels.*	
	Were estimates estimated with acceptable pre-cision.	Yes / No	*For example, a coefficient of vari-ance less than 20% is good, less than 30% is acceptable, but 40% above is considered to be poorly estimated*	*For example, a coefficient of variance less than 20% is good, less than 30% is acceptable, but 40% above is considered to be poorly estimated*
WGRFS ASSESSMENT on the SURVEY				
	Strengths			
	Weaknesses			
	Recommendations			
Short description of the survey and key issues followed by conclusion and suggestions form improvement.				