

Effective governance of marine recreational fisheries in Europe is needed to maximize the societal benefits of its fisheries

Fabio Grati ^{1,2,*}, Kieran Hyder ^{3,4}, Estanis Mugerza⁵, Robert Arlinghaus^{6,7}, Jerome Baudrier⁸, Brigid Bell⁹, Luca Bolognini^{1,2}, Annica I. De Groot¹⁰, Hugo Diogo^{11,12}, Kevin Haase ¹³, Pablo Pita ¹⁴, Warren Potts ¹⁵, Zachary Radford³, Amelie Regimbart¹⁶, Martina Scanu ¹, Christian Skov ¹⁷, Didzis Ustups¹⁸, Thomas Verleye¹⁹, Jon Helge Vølstad ²⁰, Marc Simon Weltersbach ¹³, Harry V. Strehlow¹³

¹Institute of Marine Biological Resources and Biotechnologies, National Research Council, Largo Fiera della Pesca, 60125 Ancona, Italy

²NBFC, National Biodiversity Future Center, 90133 Palermo, Italy

³Centre for Environment, Fisheries and Aquaculture Science (Cefas), Pakefield Road, Lowestoft, Suffolk NR33 0HT, United Kingdom

⁴School of Environmental Sciences, University of East Anglia, Norwich Research Park, Norwich, Norfolk NR4 7TJ, United Kingdom

⁵AZTI Marine Research, Basque Research and Technology Alliance (BRTA), Txatxarramendi ugarteia z/g, 48395 Sukarrieta, Spain

⁶Leibniz Institute of Freshwater Ecology and Inland Fisheries, Müggelseedamm 310, 12589 Berlin, Germany

⁷Humboldt-Universität zu Berlin, Faculty of Life Sciences, Division of Integrative Fisheries Management, Invalidenstrasse 42, 10115 Berlin, Germany

⁸Ifremer, Délégation pour les Antilles, Station de Martinique, Unité Biodivenv, 97231 Le Robert, France

⁹Substance, Canada House, Manchester M1 5FW, United Kingdom

¹⁰Swedish University of Agricultural Sciences, Department of Energy and Technology, 750 07 Uppsala, Sweden

¹¹Direção Regional das Pescas da Secretaria do Mar e Pescas, 9900-014 Horta, Portugal

¹²Institute of Marine Sciences – OKEANOS, University of the Azores, 9901 862 Horta, Portugal

¹³Thünen Institute of Baltic Sea Fisheries, Alter Hafen Süd 2, 18069 Rostock, Germany

¹⁴Interdisciplinary Center for Chemistry and Biology, Department of Biology, University of A Coruña, 15071 A Coruña, Spain

¹⁵Department of Ichthyology and Fisheries Science, Rhodes University, 6139 Makhanda, South Africa

¹⁶DECOD (Ecosystem Dynamics and Sustainability: From Source to Sea), Ifremer, Institut Agro, INRAE, Nantes 44311, France

¹⁷Technical University of Denmark, Section of Freshwater Fisheries and Ecology, DTU Aqua, 8600 Silkeborg, Denmark

¹⁸Institute of Food Safety, Animal Health and Environment BIOR, Lejupes 3, LV1007 Riga, Latvia

¹⁹Flanders Marine Institute (VLIZ), InnovOcean Campus, Jacobsenstraat 1, 8400 Oostende, Belgium

²⁰Institute of Marine Research, 5005 Bergen, Norway

*Corresponding author. Institute of Marine Biological Resources and Biotechnologies, National Research Council, Largo Fiera della Pesca, 60125 Ancona, Italy. E-mail: fabio.grati@cnr.it

Abstract

Marine recreational fishing (MRF) is a socially and economically relevant fishing activity in Europe, but its impacts on ecosystems and the economy remain poorly understood, and management is limited. This paper evaluates the current European fisheries governance, particularly the Common Fisheries Policy, in addressing MRF issues. Our evaluation highlights the lack of explicit recognition of MRF in European Union legislation, where recreational fisheries are not or insufficiently managed within a commercial fisheries-oriented policy framework. We recommend policy reform that explicitly recognizes recreational fisheries as a distinct fisheries sector with its own interests, values and objectives, and dynamics that differ from those typical in commercial fisheries. On the operational level, we recommend involving key organizations representing MRF interests in advisory groups dealing with marine fisheries, nature conservation, and marine spatial use, and encourage sustainable fishing practices among all types of fisheries. To achieve this, there is a need for better and more comprehensive data collection, stakeholder engagement, and outreach to support effective MRF governance and management. By addressing these issues, Europe can maximize the benefits of MRF, while ensuring the sustainability of fisheries.

Keywords: marine recreational fisheries; common fishery policy; data collection framework; multilevel governance

Introduction

European fisheries face a range of pressures that can be addressed, at least in part, by more effective national, regional, and international fisheries and marine ecosystem governance (Guggisberg et al. 2021). Marine recreational fishing (MRF) is an important activity in Europe (Pawson et al. 2008) with

a participation rate of 1.6% of the total population, corresponding to 8.7 million marine recreational fishers (Hyder et al. 2018). MRF in Europe exerts significant fishing effort (77.6 million days per year) and has a considerable direct (€5.9 billion annually) (Hyder et al. 2018) and total economic impact (€10.5 billion annually), supporting around 100 000

jobs (Hyder et al. 2017). Depending on the status of stocks and their exploitation by both commercial and recreational fisheries, significant impacts caused by recreational harvest on certain stocks are possible (Kleiven et al. 2016, Hyder et al. 2018, Radford et al. 2018, Lewin et al. 2019, Erbay et al. 2024). MRF is practised using a wide variety of gears (e.g. rod-and-reel, pots, traps, nets, spears, and hand gathering) that are operated both from boats or from shore, with effort widely dispersed making data collection, stakeholder representation, and management challenging (Hyder et al. 2017, 2020, Arlinghaus et al. 2019). MRF generates important social benefits for participants (Gascon et al. 2017, Griffiths et al. 2017, Hook et al. 2022, Pita et al. 2022), and creates economic benefits in coastal communities (Williams et al. 2020, Strehlow et al. 2023). These benefits can be maximized when MRF is effectively integrated into marine fisheries governance and management (Arlinghaus et al. 2019, Potts et al. 2020).

Potts et al. (2020) developed seven broad recommendations for what they perceived to be a ‘world class approach to recreational fisheries governance’. Accordingly, effective fisheries governance requires explicit acknowledgement of recreational fisheries with a clear legal definition, a well-developed policy statement that integrates the objectives of recreational fisheries explicitly, extensive co-management processes, clearly defined biological, economic, and social monitoring structures, and efficient and transparent cost recovery mechanisms (Potts et al. 2020). To ensure adaptation to rapidly changing conditions, recreational fisheries policies should be adaptive to new situations, should recognize all fishery sectors, and proactively incorporate flexible planning and contingency plans to secure the diverse values of resources efficiently and effectively for all users (Potts et al. 2020). Other recommendations for fisheries policy reforms tailored to recreational fisheries were summarized by Arlinghaus et al. (2019) as: (1) formulating explicit objectives for recreational fisheries that go beyond maximum sustainable yield (MSY); (2) creating organizations to unify the sector and develop co-management schemes; (3) managing diversity at all levels and promoting the self-regulatory properties of recreational fisheries; (4) creating the right incentives for individual fishers and limiting recreational fishing privileges to safeguard sustainability; and (5) improving monitoring and assessment practices. Best practices of MRF governance were identified in the USA and Australia as they include policies that outline the broad principles, fisheries laws, and regulations relating directly to this fishing sector, while also identifying the organizations or structures that fulfil its governance and management roles and integrating recreational fisheries in the governance processes (Potts et al. 2020).

In the European Union (EU), marine fisheries are governed through the Common Fisheries Policy (CFP) (European Union 2013). Some European countries with MRF are not members of the EU, such as Norway and UK, which have their own policies that consider MRF to a varying degree. In Norway, around 33% of the population participates in MRF (Hyder et al. 2018), while at the same time being a popular destination for international tourist anglers. The Marine Resources Act (LOV-2008–06–06–37) plays a central role in Norwegian fisheries management, regulating both commercial and recreational fishing activities. Amendments to this act introduced fees for the commercial fishing fleet to support research and monitoring efforts, although funding specifically for studying

MRF remains limited. In the UK, MRF is governed by the UK Fisheries Act 2020, which recognizes it as a distinct sector eligible for funding through various government mechanisms. Fisheries management in the UK involves fisheries management plans outlined in the Fisheries Act, emphasizing the importance of gathering biological, economic, and social data on MRF.

The CFP sets the systems for monitoring, assessment, control, and enforcement alongside funds for the development of fisheries in Member States (MS) of the EU. It aims to maximize the socio-economic benefits generated from fisheries within sustainable exploitation limits [defined as MSY, Article 4 of Regulation (EU) No 1380/2013]. MSY is a commercial, production-oriented objective typically ill-suited to regulate recreational fisheries (Hilborn 2007, Johnston et al. 2010, Arlinghaus et al. 2019) for three reasons. First, managing stocks at MSY leads to target fishing mortality rates that are associated with reduced stock sizes (and correspondingly low catch rates for anglers) and strongly size-truncated fish populations, which jeopardizes the probability of catching desired large fish (Hilborn 2007). Second, maximizing recreational fishing quality is centred on experience-based qualities that are often independent of stock size and catch outcomes—aspects neglected by the MSY concept (Johnston et al. 2010). Third, due to the diffuse nature of recreational fisheries monitoring, allocating catch shares between commercial and recreational sectors to achieve MSY is exceedingly difficult and often leads to conflicts (Abbott 2015).

As the CFP was designed for commercial fishing, inclusion of MRF in fisheries governance in the EU has been limited, regulations that affect recreational fisheries have often been designed in an *ad hoc* fashion and management of recreational fisheries therefore remains indirect, with only a single statement in the CFP stating that MRF should be managed in a way that is compatible with the goals of the CFP (clause 3 of Regulation EU 1380/2013). A previous assessment of MRF in Europe has therefore highlighted the need to embed MRF in the CFP and recognize it as a sector for development (Hyder et al. 2017). A review of the performance of the CFP, including the process of resource allocation to the commercial and recreational fishing sectors, produced neutral results, as MRF is not recognized as a sector under the CFP. In contrast, monitoring and the inclusion of recreational catch data in ICES assessments and advice was evaluated more positively (Belschner et al. 2019).

Previous reform of the CFP have not considered aspects of MRF governance (Gray and Hatchard 2003, Pawson et al. 2008, Salomon et al. 2014), and although research has evaluated the alignment of MRF management with the ecosystem-based approach to fisheries, it did not assess the effectiveness of MRF governance in Europe (Pita et al. 2018). Several regulatory actions targeting MRF have recently been implemented to support conservation goals for certain stocks. Examples include the introduction of daily bag limits for Atlantic cod (*Gadus morhua*) (Haase et al. 2022) and European sea bass (*Dicentrarchus labrax*) (ICES 2018). These regulations have escalated conflicts between the commercial and recreational sectors (Arlinghaus et al. 2021).

Here, we describe how the CFP has addressed MRF and assess the effectiveness of current EU governance of MRF against a novel framework derived by combining two existing governance reform approaches (Arlinghaus et al. 2019,

Table 1. Performance criteria that constitute efficient MRF governance (modified and updated from Arlinghaus et al. 2019 and Potts et al. 2020).

Criterion	Description
Legal definition	Have a clear legal definition for the MRF sector that specifies whether the sale of harvest is allowed and distinguishes it from other types of fisheries.
Policy goal	Develop a policy goal, which clearly states that fishery resources provide recreational fishing opportunities that should be developed and optimized.
Sectoral acknowledgement	Assess and recognize the socio-ecological and societal importance of MRF, explicitly acknowledging them in fisheries policy.
Allocation framework	Provide an allocation framework that fairly and equitably distributes fishery resources to the commercial and recreational fisheries directly or indirectly. This should outline the access to the resource, be developed in cooperation with all fisheries sectors, be informed by social context, cultural, economic, and ecological factors, and responsive to change.
Co-management	Cooperate with all relevant stakeholders and empower them to develop recreational fisheries management plans and encourage cooperative decision making.
Monitoring	Monitor biological, economic, and social impacts of the recreational fishery, with clear responsibilities for data collection and incorporation of data into the management process.
Compliance	Include a broad range of mechanisms to support compliance activities, as the successful implementation is dependent on compliance with fisheries regulations. This should include education and awareness activities that promote compliance and encourage ethical behaviour.
Adaptive planning	Frame governance in the context of a changing environment that includes the promotion of adaptive planning, the development of contingency plans in case of stock collapse, the incorporation of shifting species into regulatory frameworks, and the improvement of knowledge of climate change within the sector.
Multilevel governance	Multilevel governance at supranational, national, and regional level should be supported by institutional structures clearly regulating decision making and stakeholder involvement that fosters efficient bespoke regional MRF management systems and supports voluntary controls introduced by the sector.

Potts et al. 2020). The framework has been modified and updated to account for the fragmented European fisheries governance system. We highlight key issues and propose solutions to maximize societal benefits of MRF in the future.

Method for assessing EU MRF governance

The policy analysis and future vision for EU MRF governance was motivated through document review and discussions conducted within the International Council for the Exploration of the Seas (ICES) Working Group on Recreational Fisheries Surveys (WGRFS). The WGRFS includes 135 experts from 33 countries including participants from most European MS and the UK, Norway, the USA, South Africa, and Australia. This group contributes recreational fishery data and estimates to ICES stock assessments and advisory processes, operating within a quality assurance framework and addressing the requirements of the EU Data Collection Framework (DCF) and other relevant initiatives. As a key forum for the planning and coordination of recreational fisheries data collection and analysis, the WGRFS plays an important role in supporting the development of MRF governance.

The perspectives presented in this paper were developed through discussions at WGRFS meetings in 2022 and 2023 (ICES 2023, 2024) and followed a four-step process. We chose to integrate and adapt two existing frameworks (Arlinghaus et al. 2019, Potts et al. 2020) to identify nine key performance criteria essential for effective MRF governance in Europe (Table 1). Next, a synthesis of the current MRF governance landscape was produced, drawing on expert insights into existing systems and structures within the EU. Finally, a consensus was reached through discussions on the current status of MRF governance in Europe (categorized as negative, neutral, or positive) and a vision for future effective governance was defined for each of the nine criteria within the framework (Table 2).

A unified framework for assessing effectiveness of MRF governance

Two frameworks exist for assessing the effectiveness of recreational fisheries governance (Arlinghaus et al. 2019, Potts et al. 2020). These two frameworks have been combined, modified, and updated to include all performance criteria that constitute efficient MRF governance (Table 1). The status quo of the criteria was evaluated as negative (red) if the criterion was not present, as neutral (yellow) if parts of it were present, and as positive (green) if the criterion was fully covered in the CFP and subordinate legislation.

European governance structures

The EU operates through a hybrid system of supranational and intergovernmental decision-making, and according to the principles of conferral (i.e. it should act only within the limits of the competences conferred on it by the treaties) and of subsidiarity (i.e. it should act only where an objective cannot be sufficiently achieved by the MS of the EU acting alone). The European Commission (EC) is the executive branch of the EU and is responsible for proposing legislation, implementing decisions, and upholding EU treaties. Laws made by the EU institutions are passed in a variety of forms, and they can be classified into two groups: those which come into force without the need for national implementation measures (Regulations) and those which specifically require national implementation measures (Directives). Among the former, EU Delegated Decisions are directly applicable to MS and do not need to be transposed into national legislation, ensuring consistent implementation across MS. All three variants are common in the CFP (European Union 2013).

To account for the diversity of actors and regional seas and related structural issues, efforts were made to decentralize in the sense of regionalization and co-management of the CFP (see Eliasen et al. 2015 for a definition of regionaliza-

Table 2. Assessment of the current state of EU MRF governance and future needs to ensure an efficient governance using the combined framework (Arlinghaus *et al.* 2019, Potts *et al.* 2020).

Measure	Current state	A vision for the future
Legal definition	The control regulation (2023/2842) has a clear definition of MRF, including the prohibition on the marketing or sales of catches from recreational fisheries.	In addition to the MRF definition, clear definitions are provided for each of the main fishing modes (e.g. rod and line, nets, traps and pots, spearfishing, and charters) to enable fair and effective management.
Policy goal	There is no policy goal for MRF in the CFP. Few MS have policy goals concerning MRF.	MRF to be fully embedded in the next revision of the CFP alongside policy goals outlining that fishery resources provide recreational fishing opportunities and development. This would allow MS to understand the direction of travel for MRF and developed their own goals outlining their intentions.
Sectoral acknowledgement	Socio-economic importance of MRF is recognized, but unclear how this affects allocation decisions.	Socio-economic importance and societal relevance of MRF is clearly stated in the CFP.
Allocation framework	The CFP does not contain an allocation framework that regulates the distribution of fishery resources between commercial and recreational fisheries.	Establish an allocation mechanism in the CFP that explicitly ensures the fair and equitable distribution of fishery resources between commercial and recreational fisheries.
Co-management	Some MS have co-management processes where MRF is included, but the situation with respect to the EC is less clear. There are angling groups that lobby the EC (e.g. European Anglers Alliance) alongside groups in the European Parliament focused angling, and engagement in the Advisory Councils.	Clear and transparent co-management processes are in place that include all stakeholders (i.e. MRF, commercial fisheries, and NGOs) throughout the process. This would ensure robust codesigned management solutions that are supported by all communities and improve compliance. Capacity building could be necessary for the recreational fisheries representatives.
Biological, economic, and social monitoring	Clear requirements for biological monitoring encompassed in the EU MAP, but a large variation in the implementation between MS leading to issues surrounding use of data to support management and advice. No requirements for economic nor social data on MRF.	A holistic data collection programme for MRF is included in the EU MAP covering biological, economic, and social monitoring. This should be consistent across MS and cover the majority of species caught by MRF.
Cost recovery	Requirements for licensing varies between MS, but recent updates to the Control Regulation (2023/2842) mandate national registries of marine recreational fishers. However, it is unclear if the fees from licences, where they exist, are earmarked to support MRF management.	Licences in place in all MS for MRF, with funds generated used to support research, develop the sector, and improve access. Policy should clearly articulate how the funds generated should be allocated and utilized.
Compliance	Limited efforts are made to inform recreational fishers about regulations related to MRF (e.g. size limits, bag limits, and closed seasons) at an EU level. As a result, noncompliance is possible due to lack of knowledge or not agreeing with the restrictions. Little is done to promote compliance and enforcement is limited. Hence, levels of compliance and reasons for noncompliance are not known.	Good governance principles and transparent stakeholder involvement foster compliance with MRF regulations. Publicity is developed with the angling community to increase knowledge of management. Normative measures through environmental education and co-management are implemented to improve levels of compliance.
Adaptive planning	CFP states that fisheries management should account for changing climate, but it is unclear how this is implemented and only relates to changes to the biological system, rather than the impacts on fisher behaviour.	Horizon scans are done to identify new opportunities for MRF and any associated issues relating to fisher behaviour due to changing climate. Management measures are codesigned in the context of climate and behavioural change.
Multilevel governance	The fragmented European governance system with its institutional asymmetries (i.e. the EU retaining exclusive jurisdiction over fisheries in general, the MS jurisdiction over MRF management in particular) makes MRF governance inefficient. This results in challenges for MRF management across MS, unless common technical measures and catch limits can be agreed (e.g. sea bass and western Baltic cod).	Establishment of a regional framework with institutional structures that support MRF governance (i.e. policy making, decision making, and stakeholder involvement). Reform of the CFP outlining the roles of the EC, MS, ACs, RFMOs (e.g. ICCAT, General Fisheries Commission for the Mediterranean), and regional groups that allow effective governance of MRF through bespoke regional approaches.

Colours indicate negative (red), neutral (yellow), and positive (green) ratings in terms of performance against the measures.

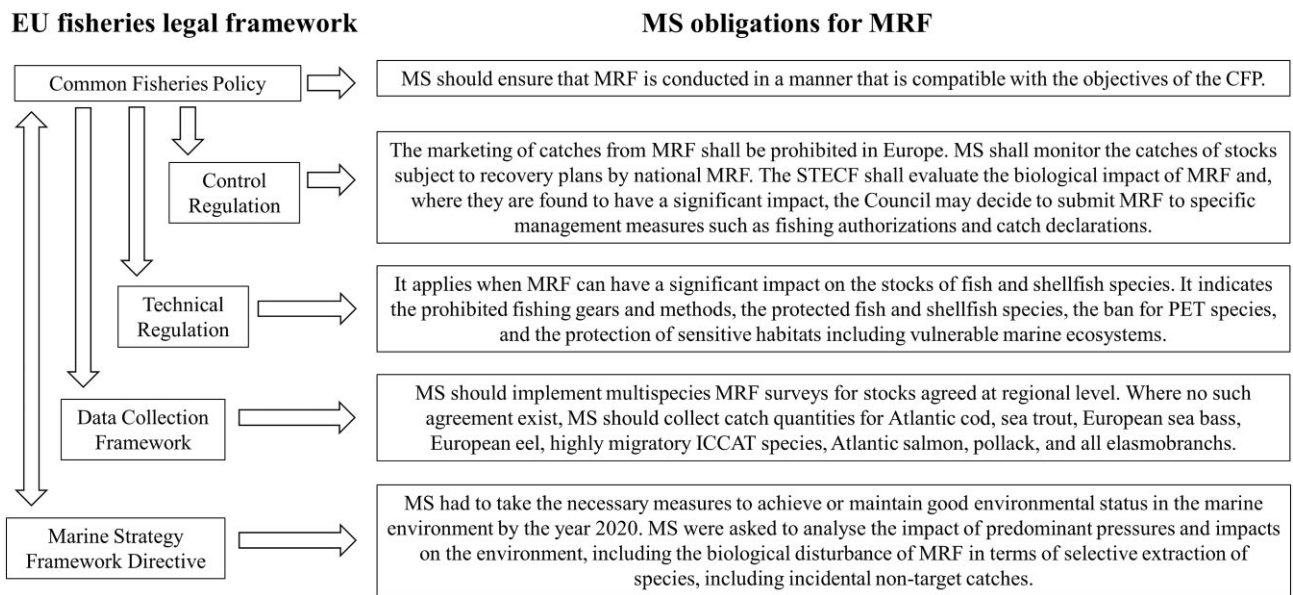


Figure 1. Diagram showing the interactions between European governance and national obligations for MRF.

tion). This led to the formation of (Regional) Advisory Councils (ACs) and so-called Regional Groups. The former are formal structures that involve stakeholders to make recommendations and proposals to improve fisheries management and the socio-economic and conservation aspects of fisheries. The latter are an association of MS around a specific regional sea that are empowered to issue joint recommendations, which the Commission then implements in delegated acts. The issues of regionalization and devolution of decision-making is an important aspect, but not part of this study.

CFP

The overarching objective of the CFP (European Union 2013) is the sustainable exploitation of the marine fisheries resources, by focusing on the environmental, economic, and social dimensions of fisheries management. In particular, the CFP aims to implement the ecosystem approach to fisheries management to ensure that the negative impacts of fishing activities on marine ecosystems are minimized. The CFP adopts a fishing mortality target that produces MSY, defined as the stock level that maximizes the fish landings beyond which stock productivity will decline. However, this approach is not suitable for recreational fisheries (Hilborn 2007), which perform better when fishing mortality is set lower than MSY, resulting in more abundant fish stocks, higher catch rates for anglers, and a greater proportion of large fish in the stock (Johnston et al. 2010). The only reference to recreational fisheries in the CFP emphasizes that recreational fisheries might be regulated to achieve MSY-based targets, which suggests policy makers perceive recreational fishing mortality to have relevant impacts on fish resources. Specifically, the CFP states that MS should ‘ensure that MRF are managed in a manner that is compatible with the objectives of the CFP’ (Fig. 1). This means that although MRF is tangentially included in the CFP and MRF mortality may be regulated through the EU, the management of MRF typically remains national competency and the responsibility of individual MS. This approach does not promote alignment of management practices between MS. Despite this, there are cases where EU institutions (e.g. EC) have

regulated MRF, especially when the objective was to rebuild threatened stocks, as demonstrated by the case of the western Baltic cod. In this fishery, a daily bag limit for recreational fishers was initially introduced in 2017, which was gradually reduced to zero as of January 2024 in line with the collapse of the stock (Haase et al. 2022, Lewin et al. 2023). The key point is that measures to regulate recreational fisheries within the CFP are usually only implemented in response to a crisis, such as the collapse of a stock that has been negatively impacted by decades of overfishing or environmental changes. In contrast, no measures are introduced to achieve social and economic objectives for MRF because there is no objective to sustainably develop the recreational component of fisheries in the EU. This approach precludes the regional implementation of preventive measures that could optimize the societal benefits of MRF and fisheries as a whole.

Control Regulation

The Council Regulation (EC) 1224/2009 (European Union 2009) and the Control Regulation (EC) 2023/2842 (European Union 2023) established a control and enforcement system for MS 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. For example, the Control Regulation prohibits the sale of MRF catches in Europe, mandates monitoring of MRF that targets stocks that are subject to recovery plans, and allows for the implementation of specific management measures, where MRF has a significant impact on a stock. The EC has implementing powers for consistent enforcement of rules related to species, stocks, and reporting, which is useful for coherence among MS. Before 10 May 2024, coastal MS had to decide if they use an electronic system developed at national or Union levels. The electronic catch reporting shall record and report catches from MRF on a daily basis, covering species or stocks subject to Union conservation measures specific to recreational fisheries, such as quotas, catch limits, and bag limits. From 10 January 2026, coastal MS must register individuals involved

in MRF and implement the electronic reporting system. From January, 1 2030, MRF catches must be reported for species or stocks under Union fishing opportunities, multiannual plans, or landing obligations, where scientific advice suggests significant impacts from MRF on fishing mortality. Data collected based on a methodology determined by each coastal MS are to be submitted to the Commission annually for the preceding calendar year. However, as the methods of data collection are not standardized between the MS, there is little alignment and comparability.

Technical Regulation

The Technical Regulation (European Union 2019a) focuses on the conservation of fisheries resources and the protection of marine ecosystems through technical measures to support the implementation of the CFP. The regulation states that technical measures should apply to MRF, where relevant due to its impacts on fish and shellfish stocks. Specific rules are set for both commercial and recreational fisheries, including restrictions on prohibited fishing gears and methods, protections for certain fish and shellfish species, bans on protected, endangered, and threatened species, and measures to safeguard sensitive habitats, including vulnerable marine ecosystems. Where MRF is judged to have a significant ecological impact, the EC can therefore adopt technical measures for MRF.

EU Multiannual Programme

Mandatory data collection requirements for fisheries were placed on the MS in 2001 through the DCF (European Union 2000, 2001, 2004a, 2008a, 2008b), which was replaced by the EU Multiannual Programme (EU MAP) in 2016 (European Union 2016) (Fig. 1). Article 25 of the CFP mandates that all MS collect and manage the biological, environmental, technical, and socio-economic data necessary for fisheries management and make this data available to end users, including bodies designated by the EC. Relevant MRF species identified in the EU MAP include Atlantic cod, European sea bass, European eel (*Anguilla anguilla*), pollack (*Pollachius pollachius*), Atlantic salmon (*Salmo salar*), sea trout (*Salmo trutta*), elasmobranchs, and highly migratory species considered by the International Commission for the Conservation of Atlantic Tunas (ICCAT) with requirements varying by region (European Union 2019b). The latest implementation of the EU MAP introduced in 2021 (European Union 2021) requires MS to implement statistically robust multispecies sampling schemes that enable MRF catch (typically consisting of the harvested and released component) to be estimated for stocks agreed at regional level, in accordance with end-user needs. In the absence of such schemes, MS must collect data that allow for the estimation of catch quantities for the species listed above, including salmon and eel (and sea trout in the Baltic Sea) in freshwater environments. Moreover, where recreational catches affect the development of fish stocks, MS shall carry out biological sampling in accordance with end-user needs, as agreed at marine region level.

Marine Strategy Framework Directive

The Marine Strategy Framework Directive (MSFD; European Union 2008c) was established to protect the marine ecosystem and biodiversity, which are essential for human health and marine-related economic and social activities. It provides a framework for MS to develop strategies that include

measures to achieve or maintain Good Environmental Status (GES) in the marine environment. Marine strategies apply an ecosystem-based approach to the management of human activities, ensuring that their cumulative impact remains within levels compatible with achieving GES. This approach safeguards the capacity of marine ecosystems to respond to human-induced changes, while enabling the sustainable use of marine goods and services for present and future generations. There are 11 descriptors that relate to: biodiversity; nonindigenous species; commercial fish species; food webs; eutrophication; sea floor integrity; hydrographical conditions; pollution; contaminants in seafood; litter; and underwater noise. Pressures and impacts on the environment from MRF can be significant, including biological disturbances such as the selective extraction of species, incidental nontarget catches, and habitat degradation (e.g. from hand gathering or boating) (Lewin et al. 2019). As an EU directive, detailed provisions of the MSFD must be implemented through national legislation in each MS.

Interactions of EU governance with national and regional regulations

There is considerable variability in the level of recognition of recreational fisheries in national policies around the world (Potts et al. 2020). In Europe, recreational fishing (or its synonymous terms such as ‘angling’ or ‘sport fishing’) was referred to in the legislation or regulations of 43 countries, with definitions widely ranging between them (Pawson et al. 2008, Potts et al. 2020). However, the interaction between national, European, and international legislation is very important as monitoring and managing MRF in accordance with the CFP is ultimately a national competency.

Despite monitoring requirements for MRF under the DCF/EU MAP (which was put in place in 2001), approaches, species, and coverage vary greatly between MS with routine annual programmes exist in few countries. A review of the MRF pilot studies methods and results obtained by MS under the EU MAP for 2017–2019 was carried out (Grati et al. 2021). This review revealed that the objectives and coverage varied, for example some MS focused on mandatory species in the EU MAP rather than conducting multispecies surveys (Grati et al. 2021). The variety of approaches and lack of data meant that comparisons of commercial and recreational fisheries were often not possible (Grati et al. 2021). This lack of data has hampered the inclusion of MRF in stock assessments by ICES, has restricted management advice to a limited number of stocks (e.g. western Baltic, North Sea and Irish Sea cod, northern and Biscay sea bass, and Baltic salmon) and has impacted the ability to manage fisheries within biologically sustainable limits (Hyder et al. 2014, 2018, 2020). The management of MRF in Europe is *de jure* the responsibility of the MS; this particularly applies to coastal areas within 6 nautical miles, which is national territory (not community waters within the CFP) and where national and in some cases state-level fisheries legislation covering recreational fisheries applies (e.g. in coastal lagoons in north-eastern Germany, Arlinghaus et al. 2023). The EU is legally permitted to implement management measures for MRF only when rebuilding measures are required for marine stocks in poor biological condition, and where MRF is believed to significantly contribute to overall fishing mortality. This has happened, for example, in the cases of western Baltic cod and northern and Biscay

stocks of European sea bass. Accordingly, MRF governance in Europe is complex, as it primarily occurs at national level, with the exception of a few critical examples where EU legislation regulates MRF for highly visible stocks (e.g. cod and sea bass). Many monitoring and control activities are jointly designed and regulated at both EU and national levels, particularly in nearshore coastal areas. As a result, the individual MS pursue different strategies to govern MRF (Pita et al. 2018). This unique setting makes a holistic assessment of MRF governance in Europe challenging.

Northern sea bass was one of the first commercial/recreational mixed-stock fisheries in Europe, where a rapid decline in the stock was observed from around 2009 (ICES 2018) and was attributed to a combination of over-fishing and poor year class strength. Management measures, including closed seasons, catch limits, and an increase in the minimum landing size were introduced for both commercial fisheries and MRF in 2015. For MRF, the management measures have varied since then, but have included a minimum landing size of 42 cm alongside a closed season and a bag limit (ICES 2018). Due to the different legislation in the EU MS, targeted fishing for sea bass was subsequently banned in Germany during the closed season, as targeted catch and release is not allowed under national fish welfare standards (Arlinghaus et al. 2012). This example shows that the existing multilevel governance in the EU can also lead to different forms and associated effects on the MRF sector in each MS.

Effectiveness of current EU fisheries governance of marine recreational fisheries

Our analysis of the current EU governance of MRF revealed that only one criterion has a positive (green) status, while six criteria have a neutral (yellow) rating, and three criteria were assessed as negative (red) (Table 2). Hence, the current governance system for MRF in Europe has considerable shortfalls. The reasoning for each rating is provided below, with red ratings addressed first as a priority for reform followed by the yellow and green categories.

First, at a European level, there is no policy goal which clearly articulates targets, goals and directions relating to MRF (e.g. formulating policy goals and operational objectives, secured rights for participation and empowerment, providing an allocation framework outlining access to the resource, developed in cooperation with all fisheries sectors, informed by social context, cultural, economic, and ecological factors, and being responsive to change). There are recreational-fisheries policy goals in a small number of MS, but these often only cover parts of the system (i.e. not all methods or gears). Second, there is no clear and transparent mechanism for the allocation of fishing opportunities between recreational and commercial fisheries in a manner that maximizes societal benefit and promotes a sustainable harvesting of stocks. Third, the promotion of compliance is limited to educational materials provided by the EU and MS to explain MRF management measures (e.g. bag limits, minimum sizes, and closed seasons for sea bass). However, there is limited knowledge about the levels of compliance and the factors influencing it. Combined with limited enforcement, this means that compliance in MRF often depends on individuals' personal, voluntary choices based on their beliefs (Bova et al. 2018). Promoting compliance should involve enhancing awareness

of management and other endeavours aimed at positively influencing behaviour (Mackay et al. 2020), given the current inadequate implementation of such actions in the EU (Table 2).

Yellow ratings were found for the criteria co-management, monitoring, cost recovery, and climate-smart actions (i.e. a management approach integrating climate change considerations into its strategies and operations) (Table 2). While numerous examples show successful adoption of small-scale fisheries co-management in various MS such as Spain (Galicia, Catalonia, and Andalusia), Portugal (Algarve and Peniche-Nazaré), Sweden (Kosterhavets), the Netherlands, Italy (Torre Guaceto), France (Île de Sein and the CoGeCo project), and Croatia (Telašćica and Lastovo), MRF typically remains excluded from such initiatives. On a supranational (EU) level, the focus of stakeholder participation lies on regional ACs (such as MEDAC, BSAC, NSAC, and so on. European Union 2004b). These stakeholder-led organizations focus primarily on providing recommendations to the EC and MS on aspects of fisheries management in the context of regionalization and usually contain representatives from recreational fishing associations. Although this includes the mandated collaboration on developing multiannual multispecies management plans, MRF concerns are often not taken into consideration due to low socio-political priority, especially compared to commercial fisheries interests. In cases where MRF is mentioned, for example in the multiannual plan for demersal fish stocks in the North Sea (European Union 2018), it is considered to impact source on fish stocks motivating measures to restrict MRF. The collection of biological data from MRF is included in the EU MAP, but the collection of social and economic data is not. This leads to undervaluation or marginalization of the MRF sector. There is also a large variation in the quality and coverage for biological data meaning that generally there is a paucity of data on MRF (Grati et al. 2021), which makes inclusion in the assessment and advisory processes difficult (Hyder et al. 2014, 2017, 2018, 2020). Licensing regimes for MRF fall under the competency of the MS, with approaches varying between countries. These regimes generate revenues, but are rarely used as a cost-recovery vehicle for MRF management. The CFP includes climate objectives, but it is unclear how these are integrated into management. The focus remains solely on changes in the biological system, rather than addressing the diverse impacts that climate change can have on recreational fisher behaviour and fishing opportunities (Townhill et al. 2019).

The control regulation (European Union 2023) is a relevant legal provision of the CFP and provides a clear definition of MRF: 'recreational fisheries' means noncommercial fishing activities exploiting marine biological resources for recreation, tourism or sport, which we considered positive as it is the only place in the EU governance where recreational fisheries is clearly defined. However, there is still need for progress with clear definitions of the main MRF modes (Table 2).

A vision for the future

It is relatively straightforward to identify what is needed to fully integrate MRF into European fisheries governance. A vision for the future of the CFP is given in Table 2 and should include:

- A clear legal definition not just of MRF, but also the different fishing modes of MRF (e.g. rod and line, nets, traps and pots, and spearfishing).
- An associated policy goal that outlines its proposed outcomes and long-term development goals for MRF in relation to recreational fishing opportunities.
- Sectoral acknowledgement in terms of socio-economic importance and societal relevance.
- Transparent co-management processes that involve stakeholders from commercial and recreational fisheries fostering monitoring and compliance.
- An allocation framework that distributes the available fishery resources and fishing grounds fairly and equitably between commercial and recreational fisheries.
- Holistic data collection programmes that collect biological, social, and economic data on MRF.
- Some form of cost recovery in conjunction with the earmarking of funds to support MRF governance.
- Voluntary compliance promoted through good governance principles, transparent stakeholder involvement, and information campaigns.
- Active enforcement of regulations to ensure compliance, backed by sufficient resources and oversight to maintain the integrity of management strategies.
- Adaptive planning enabling adaptation to climate-driven changes in biology and recreational fisher behaviour, with contingency plans in place to address unforeseen events and ensure resilience in management strategies.

There is also a need for multilevel governance at supranational, national and regional levels, supported by institutional structures that clearly regulate decision-making and stakeholder involvement, in order to overcome the fragmented European fisheries governance system (Ramírez-Monsalve et al. 2016a). The diversity of cultures, regional seas, target species, fishing methods, and participants requires bespoke regional MRF management systems. The regionalization process of the CFP has enabled new governance arrangements at the regional level (Veneroni and Jakobsen 2024). Nevertheless, the development of regional structures and processes to implement regional decision-making is still ongoing. Although progress has been made over the last two decades, there is still room for improvement to address the shortcomings identified so far. Better stakeholder involvement is one of the shortcomings that need to be overcome (Griffin 2007, Veneroni and Jakobsen 2024), not only on the issue of broader stakeholder representation, but more importantly on the establishment of regional co-management that devolves authority to the regional level (Griffin 2007, Hegland et al. 2012) and truly involves the MRF sector. This requires, however, that the MRF sector appoints and empowers representatives to participate in the regional ACs. While the latter have clear working procedures and are transparent in their work, the Regional Groups require more transparency. In general, greater engagement and cooperation between ACs and Regional Groups is needed.

The definition of MRF may require a detailed segmentation of the major fishing modes, for example rod and line, nets, traps and pots, spearfishing, and charters, to take into account the different characteristics in terms of selectivity, fishing mortality, and socioeconomic benefits and to allow fair and effective management.

To maximize the societal benefits of MRF in Europe, several steps can be taken. First of all, there is a need to establish clear

and specific policy objectives for MRF at both national and European levels. These objectives should consider the unique characteristics of MRF, go beyond simply looking at catch allocations and MSY, consider social and economic objectives and aim to promote sustainable practices, protect ecosystems, and ensure social and economic benefits for coastal communities. The Magnuson–Stevens Fishery Conservation and Management Act (2007) is the US fisheries policy that provides one such example. Moreover, the National Saltwater Recreational Fisheries Policy created by the US National Oceanic and Atmospheric Administration (NOAA) provides a framework with guiding principles to evaluate the agency's decision-making and actions to promote policy objectives (NOAA 2023), which may serve as a blueprint for the EU.

Importantly, the CFP needs to become more inclusive and balanced, addressing both commercial and recreational fishery concerns, as this would result in fair and equitable access to resources. This might involve dedicated fishing areas for MRF, setting objectives related to MRF, and allocating resources to support MRF. These and other approaches (see Arlinghaus et al. 2019) need to be included in future revisions of the CFP, so that marine recreational fisheries are an equal partner and fully embedded in fisheries governance.

While MRF in Europe is often emphasized for its socio-economic contribution, particularly in terms of supporting local economies, tourism, and providing recreational benefits (Strehlow et al. 2023), their role in food security should not be overlooked. MRF provides an important supplementary source of fresh fish for many coastal communities, contributing directly to human nutrition (and thus food security) and reducing dependence on commercial fish markets (Pitchon and Norman 2012, Cooke et al. 2018, Niemann et al. 2021). Across all European countries the per capita supply of recreational fish (inland and marine) is generally modest (Lynch et al. 2024), but the contribution to the fish consumption of individual anglers can be high (Cooke et al. 2018). This is especially the case in Scandinavian countries, Croatia (Cooke et al. 2018), or Portugal (Veiga et al. 2010). In the latter, local residents may depend on MRF as an extra source of income and food (Veiga et al. 2010). Particularly in cases where recreational catch is sold illegally to supplement monthly incomes, the question arises: is this still recreational fishing? In the EU, any fishery where catches are sold is considered commercial (Hyder et al. 2017). When fishing substantially contributes to meeting nutritional needs, it may be classified as subsistence fishing, depending on the various definitions of subsistence fisheries (Nyboer et al. 2022). While we acknowledge the fuzzy boundary that exists distinguishing between recreational and subsistence fisheries (Nyboer et al. 2022), there is no legal definition of subsistence fishing in European legislation. The implications of this omission are 2-fold: on one hand, the nutritional benefits of MRF significantly contribute to food security at local, regional or national scales and need to be recognized by policymakers; on the other hand, without proper monitoring and management, there is a risk of overfishing, which could undermine the long-term sustainability of fish stocks. Due to legal differentiation in Europe, it is likely that all monitoring data on subsistence fisheries are collected either as part of surveys for commercial fisheries or for recreational fisheries, but are not collected separately (Hyder et al. 2017). It must be ensured that the CFP adequately captures subsistence fishers in data collection programs and that management approaches are adapted to take their character-

istics into account. Effective governance of MRF must balance the socio-economic benefits with the need to ensure sustainable exploitation of marine resources. This includes integrating food security considerations into the broader framework of fisheries management, which traditionally focuses more on the commercial sector. Addressing this gap will be crucial for maximizing the societal benefits of MRF while safeguarding marine ecosystems for future generations.

Apart from recognizing the role of MRF in food supply, its importance for cultural identity and health must also be acknowledged. Cultural aspects encompass individual recreational fishers from poor, indigenous, diasporic, or immigrant communities (Pitchon and Norman, 2012, Niemann et al. 2021, Nyboer et al. 2022), as well as the social-cultural services MRF can provide (Liu et al. 2019, Niemann et al. 2021). Health aspects are 3-fold: first, MRF contributes to public health by reducing stress, improving sleep quality (Niemann et al. 2021, Pita et al. 2022), and generally enhancing well-being through recreation in blue spaces (White et al. 2021). Second, individuals engaged in MRF may consume more fish leading to positive health benefits (Cooke et al. 2018, Niemann et al. 2021, Pita et al. 2022). Third, while fish consumption can have positive health effects, wild fish may be contaminated; therefore, monitoring food safety and identifying at-risk communities are important policy considerations (Pitchon and Norman 2012, Cooke et al. 2018, Wiech et al. 2021).

Any reform of the CFP should actively consider MRF and address the shortcomings mentioned above. This may involve establishing a separate set of regulations tailored to MRF, while still working in harmony with the overall fisheries management framework. Co-management is crucial in developing effective policies. It is essential to involve recreational fishers, local communities, NGOs, and other relevant parties in the decision-making process by giving them legitimacy and strengthening the roles of ACs (Ramírez-Monsalve et al. 2016b). This will empower stakeholders to have a say in shaping the policies that directly affect their activities and livelihoods. In this context, accurate data on MRF are essential for evidence-based policy decisions, and recreational fishers will therefore have a responsibility to contribute to data collection. There should be increased investments in research and data collection methods to better understand the impact and potential of MRF, as well as its role in supporting local economies and communities, that need to be included in future revisions of the EU MAP.

To address jurisdictional mismatches and power imbalances, there is also a need for increased collaboration and communication between national authorities and European institutions. Efforts should be made to streamline decision-making processes and ensure that recreational fishing interests are adequately represented in relevant discussions and policy making. In addition, the EC needs to ensure that MRF is embedded in the advice required from ICES, and push for inclusion of MRF in stock assessments where stock impacts exist by integrating MRF concerns in multispecies multiannual management plans. Finally, it is important to work closely with the recreational angling community to promote awareness and education about sustainable fishing practices (Cooke et al. 2019). This will encourage responsible fishing behaviour, compliance with measures, and the practice of catch-and-release when appropriate to conserve fish stocks and ecosystems.

In developing a future vision for the governance of MRF within the CFP, it is critical to consider not only the promo-

tion of voluntary compliance through good governance and stakeholder involvement but also the active enforcement of regulations (Bova et al. 2018). While voluntary compliance is essential for fostering a culture of responsibility among fishers (Mackay et al. 2018), effective enforcement mechanisms are necessary to ensure that all participants adhere to established rules. This dual approach is vital for maintaining the integrity of management strategies, as it helps to prevent overfishing and other practices that could undermine the long-term sustainability of fish stocks. The costs associated with enforcement, including monitoring, surveillance, and penalties, should be adequately budgeted and supported to ensure they are effective.

Conclusions

MRF is an important activity in Europe for millions of people with relevant economic and social benefits. While commercial fishing most likely has been the dominant source of exploitation of stocks, MRF can also contribute to fishing mortality and impact the marine environment (Hyder et al. 2017, 2018, Radford et al. 2018, Lewin et al. 2019). The efficient governance of MRF in Europe needs to balance exploitation and social welfare, considering MRF not only as a source of impact but also as a generator of social benefits to society (Hyder et al. 2018, 2020, Hook et al. 2022). We modified and updated analytical frameworks developed by Arlinghaus et al. (2019) and Potts et al. (2020) to create ten criteria for effective MRF governance and applied it to the existing European system. The analysis revealed that the overall performance of MRF governance in Europe is relatively poor. MRF is not fully embedded in the CFP (EU level) and it is governed in an inconsistent manner at MS levels. The current MRF governance in Europe is *ad hoc*, mainly reactive in response to stock crises, nontransparent and jeopardizes the economic and social benefits of the sector. With increasing conflicts and demand for space associated with the current reform of energy production and climate change, threats to access to marine fisheries are bound to increase. Future reforms of the CFP need to take MRF into account and fully embed it in the policy system. This includes overcoming the fragmented MRF governance, specify explicit objectives for MRF and its economic and social importance, and reorganizing stakeholder involvement in ACs and regional groups. Policy should follow multiple objectives, such as the provision of food and recreational opportunities, and provide a framework for the allocation of fishing opportunities between commercial and recreational fisheries to resolve power imbalances, maximize the societal benefits from fisheries, and ensure fair and equitable access to fish resources. By addressing these issues and taking proactive steps to include MRF in European governance, it may be possible to maximize the benefits of MRF while ensuring its sustainability for future generations.

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Author contributions

F.G., K.H., and H.V.S.: conceptualization, methodology, formal analysis, writing original draft, review, and editing. The remaining authors supported development of the framework, helped conduct the assessment of current EU governance and future needs, and wrote and edited the manuscript.

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Data availability

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