Recreational sea fishing – the high value forgotten catch

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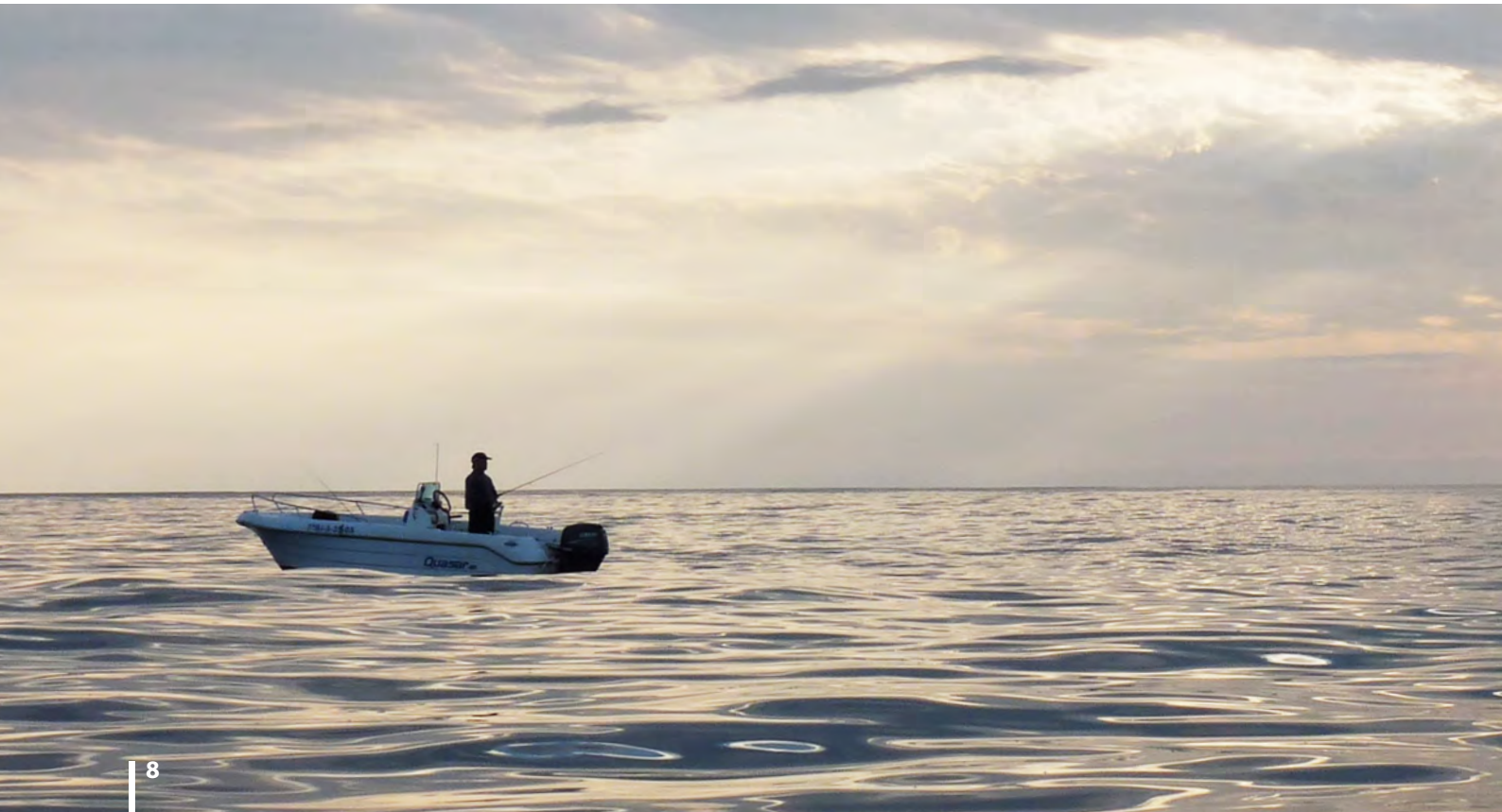
In a nutshell

- Many millions of people throughout Europe participate in recreational sea fishing. Recent surveys show that for some species, recreational fishery harvests – the weight of fish removed from the sea – can be as large as some commercial fishing fleets, but have not been accounted for until recently in stock assessments.
- Europe lags behind countries like the USA and Australia in collecting and using recreational fishery data. In the USA, nationwide recreational fishery surveys have been undertaken since the 1980s and recreational catch estimates are routinely incorporated into assessments to support co-management of many commercial and recreational fisheries.
- In Europe, marine recreational fishery survey data are sparse and only a few stock assessments use these data to estimate recreational fishing mortality. This means we have poor understanding of marine recreational fishing impacts and how to account for them in management.
- There are statutory requirements to report recreational catches of some marine species in Europe, but the surveys are demanding in



terms of expertise and infrastructure, and vary between countries. ICES established its Working Group on Recreational Fisheries Surveys to help countries run statistically sound surveys and develop other supporting studies.

- A large proportion of recreational catch is often released, so accurate estimates of post-release mortality are also required for stock assessment. Post-release mortality is difficult to measure and is dependent on many factors including capture depth, gear, and species. More studies are needed in this area.
- Recent surveys in Europe show that recreational sea fishing has a high economic value. In addition to addressing conservation goals, future co-management of European fish stocks for recreational and commercial purposes should consider how to maximize the economic and social values of the different fisheries. New methods are required to address this.

Why is recreational sea fishing a high-value forgotten catch?

Recreational sea fishing (RSF) is a high-value leisure activity in Europe, with more than 8 million anglers spending over €8 billion on the pursuit each year. During 2012, this expenditure amounted to £1.23 billion (€1.55 billion) on sea fishing, and this was estimated to support over 10,000 full-time equivalent jobs (Armstrong *et al.*, 2013). In a similar study in France, the annual outlay in 2006 and 2007 was estimated at €1.3 billion (Herfaut *et al.*, 2013). As well as the financial aspect, fishing recreationally also confers significant social benefits like relaxation, exercise, and environmental improvement (Armstrong *et al.*, 2013).

Despite recreational sea fishing catches being significant, they have been the 'forgotten catch' in Europe because the mortality from such fishing is not factored into most stock assessments. This is a particular problem for fish species that are important for both recreational and commercial fishing, and could lead to bias in stock estimates and a failure of stocks to respond as expected to management measures. Recognizing this, the European Commission includes in its Data Collection Framework (DCF) a requirement, stipulated in 2002, for Member Countries to estimate recreational catches of Atlantic salmon, European eel, European sea bass, Atlantic cod, sharks, and Atlantic bluefin tuna. On top of this, the EU Control Regulation also requires the reporting of recreational catches of depleted stocks that are subject to EU recovery

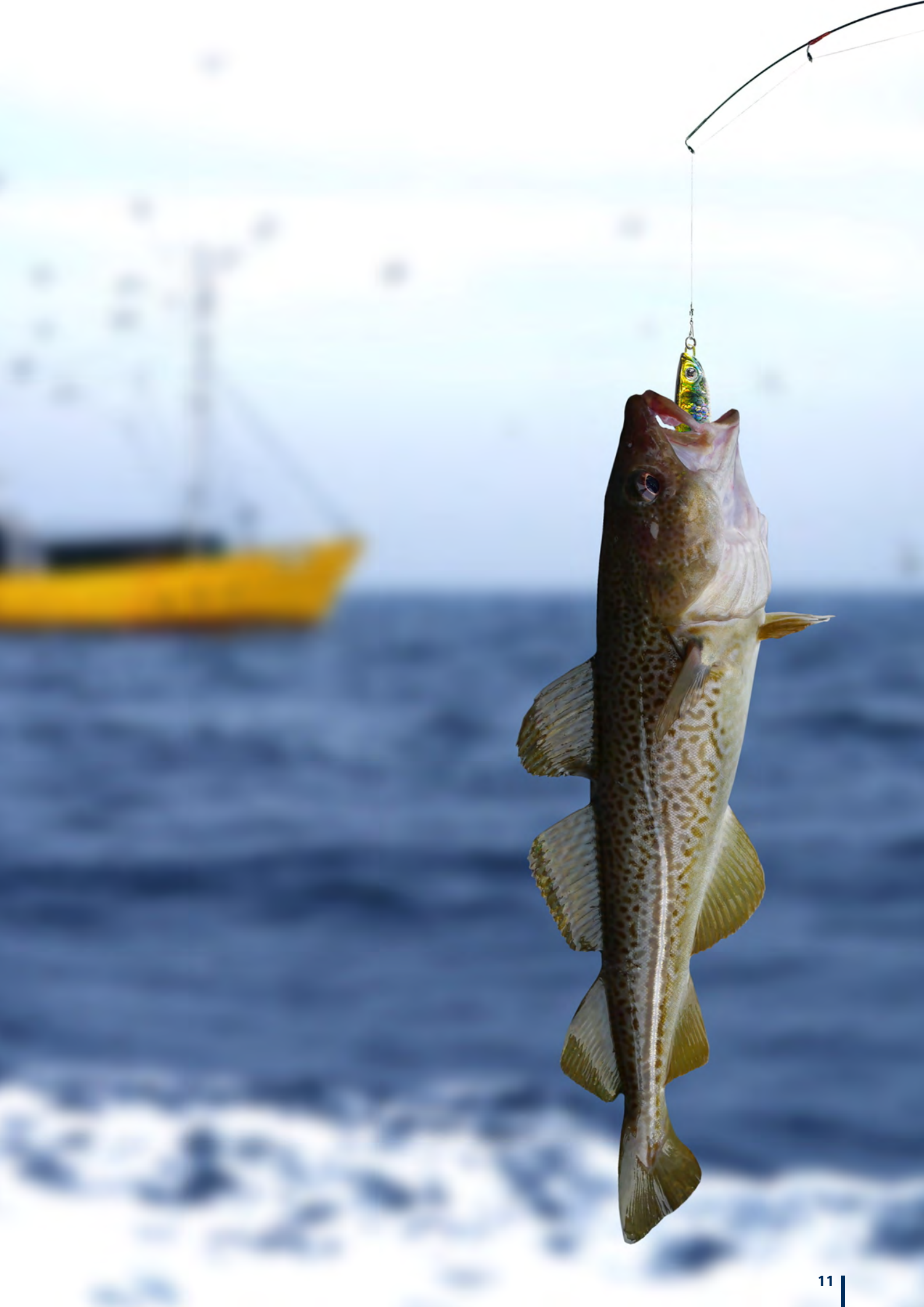
plans (such as Atlantic cod). Other species that are important recreationally and commercially, such as European lobsters and pollack, have no statutory reporting requirements for recreational catches. Recreational fishery catches of Atlantic salmon are well documented and included in assessments, but the catch is predominantly in freshwater.

Despite the DCF requirement, it has taken time for European countries to develop suitable survey methods for recreational sea fisheries and build the scientific expertise. Various surveys in France, England, the Netherlands, and Belgium since 2009 have shown that recreational fishing (mainly sea angling) was responsible for around a quarter of the total fishery harvest and fishing mortality of sea bass in the stock occupying the North Sea, English Channel, Celtic Sea, and Irish Sea (ICES, 2014). In Germany meanwhile, recreational fishing has been responsible for around 10% of the Baltic cod harvest since 2005 and has represented as much as 70% of the German commercial cod landings (Eero *et al.*, 2014; Strehlow *et al.*, 2012).

It is important of course, from a broader ecosystem perspective, to be able to quantify human impacts on all species. This is reflected in the need for data as was evident in a 2006–2007 French survey which calculated the total annual multispecies catch by RSF to be 24,000 t of fish and 3,100 t of shellfish (Herfaut *et al.*, 2013) – a level of catch not unusual across the continent (ICES, 2013b). Excluding such data from stock assessments means it is not possible to accurately determine all the human impacts on stocks, thus lessoning the likelihood of achieving sustainable fishing. It is also possible that recreational fishing impacts local stocks or stock components, and that it may inhibit recovery of depleted stocks (cf. Eero *et al.*, 2014).

How can recreational catches be included in stock assessments?

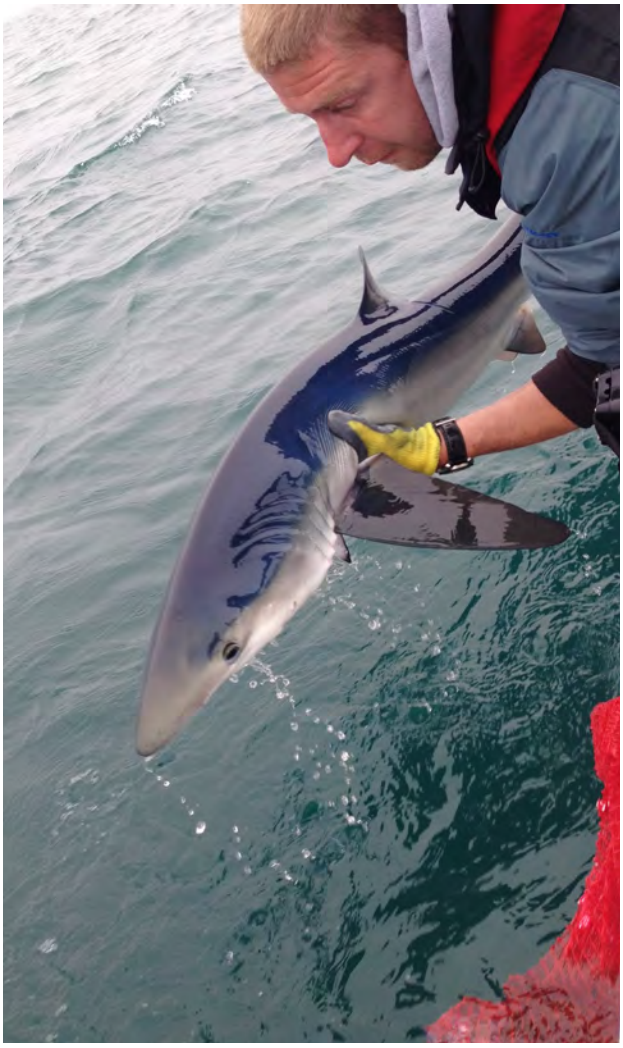
In the past, RSF in the EU has received little attention from governments and research institutions compared with data collection from commercial fisheries. However, it is not all doom and gloom – the situation is changing, some major survey efforts have been made, and recreational catch estimates have been included in the assessment of stocks like European sea bass (ICES, 2014) and Baltic cod (ICES, 2013a). However, a lack of sufficient time-series represents the main barrier to the inclusion of recreational fishery data in a greater number of stock assessments.



Estimating recreational fishery catches is not straightforward. Surveys that generate precise estimates of catch with minimal bias are both difficult and expensive, particularly where there is no register of fishers or vessels. Without such a register, nationwide population surveys are needed to quantify the number of recreational fishers and their fishing effort (ICES, 2013b). The choice of method is often dictated by the fragmented nature of recreational fishing methods (e.g. line, spear, hand-gathering, nets, traps, pots, set-lines) and platforms (e.g. shore, boat) to be included in the survey. There are many different survey methods for collecting these data, with several well-known sources of bias that need to be minimized through statistically sound survey design (see e.g. Hyder and Armstrong, 2013).

Fortunately, there is a lot of expertise on recreational survey methods worldwide. ICES established its Working Group on Recreational Fishing Surveys, WGRFS , to bring together experts from Europe, Australia, and the USA to provide methodological guidance. The WGRFS has laid down guidelines for best practice in designing and carrying out surveys to obtain reliable biological and catch estimates, and the group advises on how to assess the quality of national RSF data. More recently, the group has also highlighted the importance of evaluating the economic and social value of recreational sea fishing and engaging with the angling community.

The post-release mortality of those fish caught and then thrown back by anglers is also part of the picture. In some European countries, recreational sea anglers release more than 50% of their Atlantic cod, European sea bass, pollack, and sea trout catches (Ferter *et al.*, 2013). However, the post-release mortality of these fish is mostly unknown. Such mortality can vary significantly between different species and fisheries and depends on many factors, including water temperature, hooking injuries, and how the fish are handled after being landed (Bartholomew and Bohnsack, 2005). Studies have shown that unaccounted hooking mortalities



of about 30% or more rendered many fishing regulations like minimum sizes and bag limits far less effective than intended (Coggins *et al.*, 2007). Sub-lethal effects can also occur as a consequence of hooking and handling stress (e.g. skipping of spawning – Suski *et al.*, 2003), and behavioural changes can lead to increased mortality from other causes (e.g. due to predation – Cooke and Philipp, 2004). To be able to account for post-release mortality and sub-lethal effects when recreational catch data are included in stock assessments, it is important to conduct more species-specific post-release mortality studies or make reasonable inferences from other comparable species.

What are the future challenges for recreational sea fishing?

Co-management of fish stocks for recreational and commercial purposes has been successful in other

parts of the world, including Australia and the USA. Although the initial allocation between the commercial and recreational sectors in the USA fisheries were determined by historical harvest patterns, the Magnuson–Stevens Act – the primary basis for fisheries management – makes it very clear that allocation decisions should not be guided by economic principles alone, but also take into account whether or not the allocation decision is 'fair and equitable' (Eero *et al.*, 2014). A good example of co-management in the USA can be seen with the striped bass fishery, where a stock collapse and fishery moratorium in the 1980s was followed by the introduction of the Atlantic Striped Bass Conservation Act to give coastal states the necessary tools to cooperatively and more effectively conserve and manage striped bass stocks. Many states closed their commercial fisheries and the population began to rebuild itself. In 1995 Atlantic coastal striped bass stocks were declared fully recovered, and the stock continues to be managed on the basis of scientific assessments, which include commercial and recreational fishery data with annual catch allocations to each sector . Since the 1990s, recreational harvests have far exceeded the commercial harvest, and the growth of the recreational fishery has had major economic benefits for the coastal states.

In Europe, there is currently no equivalent management framework that attempts to balance environmental, economic, and social effects of recreational and commercial fishing, or which sets clear management goals within an ecosystem services framework. Development of this framework is the next major challenge as it involves a multi-disciplinary approach that includes biologists, ecologists, economists, social scientists, modellers, and policy-makers, and works closely with stakeholders to co-produce knowledge. This also needs to take into account the potential for increasing the value of these ecosystem services and to assess the potential for growth in the value of both the recreational and commercial fisheries under different management regimes.

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