

Theme session G

The inshore challenge: management of recreational and commercial fisheries accounting for social benefits, economic value, and biological sustainability

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Inshore fisheries can have a significant impact on coastal fish and habitats, interacting with other fishing fleets and uses of the marine environment. Hence, the effective management of inshore fisheries is important for delivery of European policy such as the Common Fisheries Policy and Marine Strategy Framework Directive, and requires a holistic ecosystem-based approach. However, the evidence needed to underpin management of these fisheries is often limited and difficult to collect. This is due to the large numbers of widely-distributed small fishing vessels exploiting highly mixed fisheries using a variety of gear types. Monitoring challenges mean that significant components of mortality are not well described, which may affect our ability to manage fisheries to achieve conservation targets.

This session brought together a broad range of scientists from different disciplines to showcase the latest state-of-the-art methods developed to address the challenges in inshore fisheries management, and identify holistic management approaches. Twenty-three presentations, eleven posters, and a group discussion were included in the session, with around 100 members of the audience. The presentations, from around the globe, focussed on data collection, assessment of data quality, regional coordination, reconstruction of missing data, and cross-sectoral co-management that accounts for social benefits, economic value, and biological sustainability. There were a number of key findings that emerged from this session and are discussed in more detail below.

Implementation of surveys and extrapolations proved to be still a challenging task, especially for recreational fisheries, given the difficulties in obtaining reasonable sampling coverage and representativeness. Recreational fisheries can account for a considerable share of exploitation for different stocks in terms of economic value and fishing mortality compared with commercial landings at European level. The use of several complementary sampling methods (e.g. web cameras with machine learning algorithms, aerial counts, onsite intercepts, boat transects) proved to be effective in geographically fragmented situations and when no obligation of registering exists.

Inshore fisheries are often caught in a cycle of data limitation, where they are perceived to be of low importance and, as a consequence, are not sampled. However, this was not the case with the importance of both commercial and recreational inshore fisheries highlighted and the need for regional approaches especially in the Mediterranean. Many different methods for data collection were presented that had been successful including traditional survey approaches applied in New Zealand and Norway, working in partnership with fishers through fisher-self-sampling, and making use of existing (e.g. AIS) and new technology (e.g. low cost open source vessel monitoring systems, remote cameras). Fully documented fisheries (FDF) and self-sampling is widely accepted by the fishing industry, but differences between self-

sampled and observer data were identified, so care must be taken when including these data in stock assessments. Cooperation with fishers had proved useful in understanding the spatial distribution of fishing effort (e.g. GPS and AIS) and had the potential to improve local spatial management. For both of these systems, it was important to demonstrate a benefit to the users and reduction of fuel costs provided by the low cost vessel monitoring had improved uptake. The use of remote cameras was shown to be a valuable approach to monitor a recreational fishery on Atlantic salmon in the Baltic Sea when used alongside traditional methods to collect biological and socio-economic data. Technology based-monitoring was seen to have great potential, as long as the challenges with privacy can be addressed.

The landings obligation and high levels of release of fish by recreational fisheries highlighted the importance of understanding post-release mortality and the challenges in obtaining robust estimates for inclusion in stock assessments. Difficulties in standardising tagging or captive monitoring data, were addressed had been addressed using a Bayesian network approach that integrates selected life-history traits to predict survival probabilities. The consequences of catch-and-release angling were also shown to be important for black bream during the parental care period, highlighting the importance of sublethal and behavioural effects.

Fisheries management was the focus of several presentations, covering a broad range of topics from the use of a temporary closure of lobster grounds due to windfarm construction to develop a new approach for management, to the need to strengthen regional cooperation in small scale and recreational fisheries data collection (fishPi project). The results of the fishPi project focused on the harmonisation of data collection methodologies through a sound sampling design and the development of a regional database. The analysis of fishing strategies of small scale fisheries in the Adriatic Sea resulted in identifying an opportunistic fishing strategy based on the seasonal adoption of species-specific set gears, and random utility models were used to develop an ecosystem-based management plan for the Bay of Biscay.

The need for inclusion of the human dimension in fisheries management is a large challenge, but is particularly important in the recreational and inshore fisheries due to the large number of participants. This was shown for a small scale traditional Italian driftnet fishery that sustains the economy of small coastal villages. Typologies had also been developed in for fishing ports in some parts of the Mediterranean fisheries that were being used to assess dependence and drivers for diversification. The response of commercial scallop fishers to management measures was being used to predict displacement due to proposed area closures. These are all important considerations when evaluating of the impact of management measures on coastal communities.

The breadth of topics and geographies covered in this session indicate the huge diversity in inshore fisheries, the growing recognition of their importance and the novel approaches being used to address the inshore challenge. It was very clear that there is no single approach that provides a panacea for all systems, rather that it is a case-by-case approach that should be driven by the fishery and end-user needs. To achieve this, it is really important to draw on experience developed in other systems around the globe, use a multidisciplinary approach, and work in partnership with the fishing community. This session provided some really strong examples and case-studies in all of these areas that will provide a good reference for ICES. It also provided a useful forum to share ideas and examples during the discussion session. The presentations demonstrated the significant progress already made, but, there is still some

way to go to address the significant challenges around the collection of robust data efficiently at regional scales, inclusion of these data in assessments, and incorporation of the human dimension.